Sydney WATER

Annual Environmental Performance Report

2023-2024

Incorporating our Special Objectives Statement

Sydney WATER

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Figures

Tables

1. Executive Summary

1 Executive summary

Sydney Water has prepared this Annual Environmental Performance Report 2023–24 which incorporates our statement on the implementation of our special objectives, as required by the *Sydney Water Act 1994* (the Act) and our Environmental Indicators Performance Report 2023–24 (Appendix A).

The report's timing meets our regulator expectations for a holistic statement and enables representation of finalised and audited data that reports on all required environmental special objectives parameters in a consolidated stand alone report.

This report summarises how we have addressed the special objectives identified in Section 22 (6) of the Act between 1 July 2023 and 30 June 2024 and provides a holistic statement focused on wastewater discharges and environmental performance. In addition to this report, Sydney Water publishes comprehensive performance reports on our website that demonstrate our implementation of, and performance against, our special objectives. Our special objectives are:

- To reduce risks to human health
- To prevent the degradation of the environment.

In implementing those special objectives, regard is to be had to the means referred to in section 6 (1) (b) of the *Protection of the Environment Administration Act 1991*, so far as they are relevant, in particular the following means:

- reducing the environmental impact of discharges into or onto the air, water or land of substances likely to cause harm to the environment,
- minimising creation of waste by the use of appropriate technology, practices and procedures,
- reducing use of energy, water and other materials and substances,
- re-using and recovering energy, water and other materials and substances, used or discharged by Sydney Water, by the use of appropriate technology, practices and procedures,

Sydney Water integrates environmental and public health management into its business decisions and operations. These specific objectives are incorporated holistically within the business, rather than being treated as separate considerations. This approach integrates social, economic, public health and environmental factors into Sydney Water's core functions. We use various management systems, plans, and frameworks to support these objectives.

Table E-1 highlights key measures from the report which demonstrate trends in performance and whether the measures are meeting targets (if established). We are committed to enhancing our environmental performance through management systems and improvement programs. The report highlights key initiatives, especially in improving our wastewater systems. These are summarised in Table E-2 against the related environmental issue. Overall, the majority of trends in our environmental performance are stable or consistent with previous years.

Table E-1 An overview of environmental issues and trends/ outcomes

Trend / Outcome Legend:

➲ No change ⬆ Increase ⬇ Decrease - year on year
● Meeting target ● Not meeting target ● Performance only

SYDNEY WATER ACT 1994 MEANS	Environmental Issue/ Indicator	Key measures from 2023–24 report	Recent performance				
			2019–20	2020–21	2021–22	2022–23	2023–24
REDUCE IMPACT OF DISCHARGES TO THE ENVIRONMENT	Environmental Performance Indicators	Ecological footprint	n/a	➲	⬆	⬆	⬆
		Net Zero Emissions - Carbon Footprint (Scope1,2 and 3)[1]	n/a	➲	⬆	⬆	⬇
	Wastewater treatment discharges	Maintain waterway flow (refer IPART indicator IE3)	⬆	⬆	⬆	⬇	⬇
		Total Nitrogen load (estimated) from inland plants[2]	⬆	⬆	⬆	⬇	⬇
		Total phosphorus load (estimated) from inland plants[3]	⬆	⬆	⬆	⬇	➲
		Oil & grease loads from Deep Ocean Outfall facilities	⬇	⬆	⬇	⬆	⬆
		Total suspended solids loads at Deep Ocean Outfall facilities	⬆	⬆	⬇	⬆	➲
	Wastewater network discharges	Number of Beachwatch sites impacted by wastewater overflows	⬆	⬆	⬆	⬇	⬆
		Number of wastewater systems compliant with their dry weather overflow limit condition	⬆	⬆	⬆	⬇	⬇
		Total number of wastewater overflow incidents reaching waterways	⬆	⬇	⬇	⬇	⬆
		Total number of chokes	⬇	⬇	⬇	⬇	⬆
		Number of chokes / 100 km	⬇	⬇	⬇	⬇	⬇
		Frequency of modelled wet weather overflows	⬇	⬆	⬆	⬇	⬆
		Wet weather overflow modelled volume	⬆	⬆	⬆	⬇	⬇
	Stormwater network discharges	Silt and rubbish removal volume	➲	⬇	⬆	⬆	⬇

[1] Target is 2030 for Scope 1 and Scope 2 emissions and 2040 for Scope 3 emissions
[2] Overall 2023-24 performance is below the licence limit except for 1 non-complaince for Picton
[3] Overall 2023-24 performance is below the licence limit except for 1 non-complaince for South Creek Bubble plants

Trend / Outcome Legend:

➲ No change 🡅 Increase 🡇 Decrease - year on year
● Meeting target ● Not meeting target ● Performance only

SYDNEY WATER ACT 1994 MEANS	Environmental Issue/ Indicator	Key measures from 2023–24 report	Recent performance 2019–20	2020–21	2021–22	2022–23	2023–24
EFFICIENT AND SUSTAINABLE RESOURCE USE	Energy use	Grid electricity consumption	🡅	🡇	🡅	🡅	➲
		Renewable energy generation	🡇	➲	🡇	🡇	🡅
		Fuel usage	🡇	🡇	🡅	🡅	🡅
		Gas consumption	🡅	🡇	🡇	🡅	🡇
	Circular Economy and Resource recovery	Biosolids – beneficial reuse	➲	➲	➲	➲	➲
		Solid waste generation	🡅	🡅	🡅	🡇	🡇
		Solid waste recycled/reused	🡅	🡅	🡅	➲	🡅
COMMUNITY INVOLVEMENT	Water conservation	Demand on drinking water (L/person/day), reduced by increase in recycled water supply	➲	🡇	🡇	🡅	🡇
	Community awareness programs	Active wastewater campaigns and education programs	➲	➲	➲	🡇	➲
	Community monitor surveys	Community monitor survey results	➲	➲	➲	➲	➲

Table E-2 An overview of environmental issues and trends/outcomes

Environmental Issue	Key Points from 2023–24 report
Reducing the environmental impact of discharges to the environment	
Environmental Performance Indicators	In 2023–24, our total ecological footprint (EF) from all sources was 117,000 ha, representing an approximate 3 per cent increase over the total in 2022–23. This is part of a general increasing trend due to a significant increase in capital expenditure. The total carbon footprint for 2023–24 was 778,000 t CO2-e (Scope 1, 2 and all Scope 3), 3 per cent lower compared to 2022–23. Scope 2 emissions (electricity) and emissions from capital expenditure were the two largest components in the total emissions.
Wastewater treatment discharges	Oil and grease loads slightly increased in our treated wastewater discharge from Bondi Water Resource Recovery Facility (WRRF) and Malabar WRRF, whereas North Head WRRF loads were similar to the previous year. Total nitrogen loads exceeded EPL limits at Picton WRRF and total phosphorus loads exceeded EPL limits at Riverstone, St Marys and Quakers Hill WRRFs.

Environmental Issue	Key Points from 2023–24 report
	Key initiatives: • Initiating projects to improve scum and sludge removal efficiency at Malabar WRRF. • Collaborating with the community and trade waste customers through community educational programs to reduce oil and grease discharges into the Sydney Water wastewater network. • Addressing the increasing suspended solids trend at Malabar WRRF by undertaking major periodic maintenance on primary sedimentation assets. • Collaborating with the NSW EPA to review its nutrient discharge regulations for the Hawkesbury-Nepean River, effective from 1 July 2025. With insights from our Hawkesbury-Nepean water quality and hydrodynamic model, as well as community involvement, the new regulatory framework will require smarter integrated water solutions that provide the best balance of social, economic and environmental outcomes for the Hawkesbury-Nepean catchment area. • Sydney Water is starting to plan studies and programs to reduce pollution, improve treated water quality and increase reuse at the Picton WRRF. We're also looking into a long-term water management strategy for the facility. • Most of the WRRFs that discharge treated wastewater into the Hawkesbury-Nepean river system are being upgraded or have planned upgrades in the near term.
Wastewater network discharges	Wastewater modelled volumes from dry weather overflows increased in 2023–24, 23.4 ML compared to 14.2 ML in 2022–23. Dry weather overflow volumes from ocean systems increased by 59 per cent, and 152 per cent from inland systems compared to 2022–23. The total number of dry weather wastewater overflows reaching waterways increased to 487 in 2023–24 (from 284 in 2022–2023). The number of uncontrolled dry weather overflows increased to 761 in 2023–24 compared to 466 in 2022–2023. Total number of chokes/network blockages experienced within our wastewater network increased in 2023–24 (11,220) compared to 2022-2023 (7,644). This was largely due to a shift towards typically El-Nino climatic conditions with lower rainfall and decreased soil moisture. The frequency of wet weather overflows from 10 wastewater systems exceeded the limits within their Environment Protection Licenses (condition L7.2 i.e. maximum number of overflows per 10 years) compared to 2022–23 (7). The modelled overflow volume from 14 inland wastewater systems was 1,097 ML in 2023–24. Modelled wet weather overflows from eight ocean wastewater treatment systems were 26,216 ML in 2023–24. Trends in wet weather overflow volume decreased for both inland and ocean systems. Key initiatives: • Various dry weather overflow abatement investigations and preventative maintenance programs. • IoT (Internet of Things) installations for overflow prevention. • Lost flow analysis to detect sewer blockages. • Continuous lining of vitrified clay pipes. • Wet Weather Overflow Abatement Program. • Customer campaigns eg. Toilet Blockers Anonymous. • Sydney Water is continuing to conduct programs (includes silt removal) of work to reduce overflows to the mouth of Mill Stream that affect Foreshore Beach.

Environmental Issue	Key Points from 2023–24 report
Stormwater network discharges	We removed silt and rubbish from over 75 stormwater quality improvement devices which prevented 1,701 m^3 of debris and 2,679 tonnes of sediment from entering Sydney's waterways in 2023–24 (compared to 3,847 m^3 and 1,159 tonnes in 2022–23). Key initiatives: • Ongoing works to naturalise and improve stormwater networks, and adoption of water-sensitive urban design principles.
Water Conservation	In 2023–24, 40,068 ML of recycled water was produced, leading to a reduction in drinking water demand by 13,061 ML, which is similar to the production in 2022–23. We are tracking at 24 GL of drinking water savings per year, against the Greater Sydney Water Strategy (GSWS) target. Water conservation activities during 2023–24 contributed 1,514 ML in annual savings, representing an increase compared to 1,473 ML in 2022–23. Key initiatives: • Ongoing implementation of water efficiency programs. • Minimise the loss of water through leakage reduction programs. • Maximise recycled water production.
Energy use	Sydney Water's goal is to achieve grid electricity consumption equivalent to our 1998 usage (366 GWh). In 2023–24, consumption was 388 GWh, above the internal benchmark by 21 GWh (similar to 388 GWh in 2022–23). Sydney Water's on-site renewable energy generation (58,820,485 kWh) increased to 13.4 per cent of Sydney Water's overall electricity consumption, compared to 2022-23 where consumption was 51,239.023 kWh, equivalent to 11.8 per cent of electricity consumption. Renewable generation increased compared to 2022–23 but remains below maximum capacity. Fuel usage from Sydney Water increased due a significant increase in major projects and capital works. Natural gas consumption decreased in 2023–24 due to reduced usage at multiple Sydney Water sites, including Potts Hill Depot, West Hornsby WRRF, and Homebush offices. The reasons for the changes vary by site. **Key relevant initiatives** • Continued implementation of the Carbon Zero Plan from 2021–22.
Circular Economy and Resource Recovery	Sydney Water has been consistently achieving 100 per cent beneficial use of biosolids captured from our WRRFs. Sydney Water generated 233,152 tonnes of solid waste, which was 33 per cent lower (345,748 tonnes) compared to 2022–23. Of this waste, 84 per cent was reused onsite, offsite or recycled. The overall recycling rate for 2023–24 was higher than 2022–23 (79 per cent). Of the waste generated from our construction and demolition activities, 80 per cent (185,810 tonnes) was recycled or reused. Key relevant initiatives • Designing the Advanced Water Recycling Centre. Adjacent to this is the Circular Economy Zone (CEZ), which aims to activate the circular economy by unlocking the value of the site by attracting complementary industries to co-locate. • Commissioned the Malabar WRRF Biomethane Project in July 2023. Co-funded by Jemena and ARENA. it became the first renewable gas facility to be registered under GreenPower's Renewable Gas Certification Scheme. • Established a macroalgae trial at Picton WRRF to investigate less carbon intensive ways to reduce the levels of nitrogen, ammonia, phosphorus, harmful bacteria and metals in treated wastewater.

Environmental Issue	Key Points from 2023–24 report
Community awareness	During 2023–24, our Community Education Team engaged with nearly 45,000 children and adults through the Wonders of Water Discovery Van to increase water literacy. The *Our Water, Our Voice* customer engagement conducted between 2022–24 provided a critical understanding of customer preferences and priorities to inform Sydney Water's price proposal to the Independent Pricing and Regulatory Tribunal (IPART). It is the largest customer engagement program in the history of Sydney Water with over 13,000 participants to date. Sydney Water participated in various events during 2023–24 to promote water conservation, encourage the consumption of tap water and let customers know about our Waterwise website. These events included cricket activations through our Cricket NSW sponsorship, partnership with the Wiggles, Yabun Festival, Pets Day Out in Earlwood, Ramadan Nights at Lakemba, the Royal Easter Show and Bankstown Bites. Water efficiency campaigns were run including: • 'The Future Of Water Depends On All Of Us – campaign with Olympic gold medallist Jess Fox, highlighting the shared responsibility of safeguarding Sydney's water as a vital resource. It served as a powerful reminder of the importance of protecting water for future generations. • 'Stop Being A Water Waster' – designed to inspire individuals and communities to adopt water-wise habits. • 'Toilet Blockers Anonymous' – a wastewater awareness campaign launched in May 2024 to remind customers to only flush the 3Ps (pee, poo and toilet paper) to avoid costly and environmentally damaging chokes and blockages. • Our Brand Tracker and Community Sentiment Monitor tools help us understand feedback from the community. • The Brand Tracker surveys over 13,000 people per annum. It showed 49 per cent of customers trust Sydney Water to be waterwise and 59 per cent as environmentally focused. The Brand Tracker Customer Promises related to the environment have remained stable during 2023–24. - Our Community Sentiment Monitor showed 82 per cent of the 1,078 people surveyed agree that they could change their behaviour to save water. One of the key challenges that Sydney Water faces is that more than half of our customers (56 per cent) believe that it is okay to flush items other than human waste and toilet paper, down the toilet. The full impact of this campaign and changes in behaviour is due to be felt in 2024–25.

2. Introduction

2 Introduction

2.1 Background

As required by the *Sydney Water Act 1994* (the Act), this Annual Environmental Performance Report incorporates our statement on the implementation of our special objectives and our Environmental Indicators Performance Report 2023–24. The Act requires us to publish our statement on the implementation of our special objectives as part of our annual report on environmental indicators.

This report summarises our environmental performance and demonstrates how we addressed the special objectives identified in the Act between 1 July 2023 and 30 June 2024.

Our business is underpinned by the three principal objectives outlined in the Act:

1. To be a successful business.
2. To protect the environment by conducting its operations in compliance with the principles of ecologically sustainable development.
3. To protect public health by supplying safe drinking water to its customers and other members of the public in compliance with the requirements of our Operating Licence.

These objectives enable us to achieve a sustainable future by balancing social, economic and environmental considerations.

In addition, Section 22 of the Act states that in implementing the principal objectives, we have the following special objectives:

1. To reduce risks to human health.
2. To prevent the degradation of the environment.

These objectives are to be interpreted and implemented as specified in Section 22 of the Act and Section 6 of the *Protection of the Environment Administrations Act 1991*, so far as they are relevant to our business. Refer to Table 2-1 for further details.

2.2 Implementing the special objectives

Sydney Water integrates environmental and public health management into our business-as-usual operations. The special objectives are addressed holistically so that we can carefully balance our social, economic, public health and environmental considerations. The management systems, plans and frameworks we've established to support our business operations include the:

- Environmental Management System, certified to the International Organisation for Standardisation (ISO)14001, provides a systematic, planned approach to protecting the environment, fulfilling compliance obligations and enhancing environmental performance.
- Quality Management System, certified to the ISO9001 standard, enables us to continually monitor and measure how we are performing so we can improve and be more effective.
- Asset Management System, certified to the ISO55001 standard, provides a framework that supports our asset management activities to deliver customer service outcomes and continual improvement.
- Recycled Water Management System, aligned to the Australian Guidelines for Water Recycling 2006, which describes the methods we use to ensure we supply high-quality recycled water to our customers and minimise risks to human health.
- Drinking Water Management System, aligned to the Australian Drinking Water Guidelines 2011, which describes the methods we use to ensure the quality and quantity of drinking water we supply to our customers.
- Work Health and Safety Management System, certified to the ISO 45001 standard, ensures we have a safe and healthy workplace.
- General requirements for the competence of testing and calibration laboratories, ISO/IEC 17025 is the main ISO standard used by testing and calibration laboratories. Accreditation to ISO/ IEC 17025 plays an important role in supporting the validity, impartiality and reliability of results from our testing and calibration laboratories.

2.3 Reporting against our special objectives

2.3.1 One Strategy to deliver our vision

Sydney Water's vision – creating a better life with world class water services – is at the core of our strategy for the 2025–2035 period (Figure 2-1). Our strategy has three customer outcomes that inform our activities and respond to the current challenges facing our customers, our business and the environment. The three customer outcomes are:

- **Customer experience -** deliver a great customer experience
- **Water quality and reliability -** provide safe, clean, reliable drinking water every day
- **Environmental Protection** – ensure we protect our waterways and environment now and for the future

Figure 2-1: Our vision, strategic outcomes and values

Table 2-1 Reporting against special objectives requirements

Sydney Water Act 1994 means	*Protection of the Environment Administration (POEA) Act 1991* means[4]	Link to relevant Strategy objectives	Where addressed in this report
Reducing the environmental impact of discharges into or onto the air, water or land of substances likely to cause harm to the environment	Adopting the principle of reducing to harmless levels the discharge into the air, water or land of substances likely to cause harm to the environment. Setting mandatory targets for environmental improvement. Promoting pollution prevention.	Environmental protection: Prevent pollution Recover resources Cool, green and natural places Net zero carbon emissions Climate resilient systems	Section 3 – Reduce impact of discharges to the environment Section 4 – Efficient and sustainable resource reuse Section 2 – Preparing for a changing climate
Re-using and recovering energy, water and other materials and substances, used or discharged by Sydney Water, by the use of appropriate technology, practices and procedures. Reducing use of energy, water and other materials and substances.	Encouraging the reduction of the use of materials, encouraging the re-use and recycling of materials; and encouraging material recovery.	Environmental protection: Recover resources Cool, green and natural places Net zero carbon emissions	Section 4 – Efficient and sustainable resource reuse · Develop and implement water conservation program · Maintain our grid-sourced electricity demand · Bioresources · Waste
Minimising Sydney Water's creation of waste by the use of appropriate technology, practices and procedures.	Minimising the creation of waste by the use of appropriate technology. Regulating the transportation, collection, treatment, storage, and disposal of waste.	Environmental protection: Prevent pollution Recover resources Cool, green and natural places Net zero carbon emissions	Section 4 – Efficient and sustainable resource reuse · Bioresources · Waste
	Promoting community involvement in decisions about environmental matters. Conducting public education and awareness programs about matters. Ensuring the community has access to relevant information about hazardous substances arising from, or stored, used or sold by, any industry or public authority.	Customer experience: Positive customer experience Informed and empowered customers	Section 5 – Community involvement · Customer satisfaction, awareness and behaviour

[4] Only the means relevant to Sydney Water's activities are listed

This report provides a holistic statement with a focus on wastewater discharges and provides trending data. In addition to this report, we publish several comprehensive performance reports on our website that demonstrate our implementation of, and performance against, the special objectives. Please refer to the following reports available at sydneywater.com.au for more information:

- Sydney Water Annual Report – covers our achievements and challenges over the previous year, our performance against our statutory requirements and the progress we've made towards meeting our corporate strategic goals.
- Water Conservation Report – outlines how we are meeting our water conservation requirements and contributing to water efficiency, leakage management and water-recycling initiatives.
    - Environment Protection Authority (EPA) pollution monitoring data reports – we test water quality at our Water Resource Recovery Facilities (WRRFs) and water filtration plants every month. We publish the results of our tests within 14 days of the last test result becoming available.
- Sydney Water Aquatic Monitoring (SWAM) program - We conduct detailed long-term aquatic monitoring programs. These help identify long-term trends in water quality and waterway health, monitor our performance and understand how wastewater interacts with the environment.

2.4 About the Greater Sydney Water Strategy

As our city continues to grow, it's essential to ensure a resilient and reliable water supply that is less dependent on rainfall. To achieve this, Sydney Water aligns with the government's aspiration to adopt new approaches for a safe and secure water supply now and in the future.

The NSW Government's Greater Sydney Water Strategy (GSWS) charts a path for delivering sustainable and resilient water, wastewater, recycled water, and stormwater services over the next 20 to 40 years, supporting the growing needs of Greater Sydney, including the Illawarra and Blue Mountains. This strategy focuses on improving resilience to extreme events, enhancing water conservation, protecting the health of our waterways and ecosystems, and making better use of stormwater and recycled water to create a cooler, greener, and more sustainable city—safeguarding Sydney even during prolonged droughts and extreme weather events.

The Greater Sydney Drought Response Plan complements the GSWS by outlining actions for the NSW Government, Sydney Water, and WaterNSW to manage future drought conditions. Sydney Water is responsible for several key actions across the five priority areas of the GSWS, with some of the most relevant ongoing ones outlined below:

Priority 1: We understand how much water we need and when

- **Community consultation**: Continue engaging the community on water restrictions, management, and supply options.
- **Water restrictions:** Review water restrictions regime design, including demand analysis, and develop recommendations

Priority 2: Our water systems are sustainable for the long term and resilient to extreme events

- **Water efficiency**: Develop and maintain a five-year Water Efficiency Plan to meet Sydney's long-term water efficiency goals.
- **Rainfall-independent supply augmentation**: Planning for portfolios of rainfall-independent supply augmentation, system resilience and water security options, including the development of our Purified Recycled Water Demonstration Plant
- **Purified Recycled Water demonstration plant**: Construct and operate a purified recycled water demonstration plant in the Sydney Basin, engaging with the community on preferences for additional water supplies and demand management.

Priority 3: Our city is green and liveable

- **Integrated water planning:** Strategic planning to enhance integrated urban water cycle management, increasing the use of stormwater and recycled water to address climate risks, support cooling and greening of landscapes, and contribute to waterway health objectives.
- **Circular economy & net zero emissions**: Develop a strategy and implementation plan to transition Sydney's water services towards a circular economy to maximise resource recovery and reduce waste from water services provided to Sydney, supporting the NSW Government's net zero emissions targets. It also involves exploring opportunities to incorporate food, energy, water, and waste processing in new or upgraded WRRFs.

Priority 4: Our waterways and landscapes are healthy

- **Wastewater system improvements:** Deliver priority overflow improvements for Greater Sydney's wastewater systems.
- **Reducing nutrient discharges:** Continue reducing nutrient discharges to the Hawkesbury-Nepean system through new works in line with NSW EPA licence conditions and ongoing research.
- **Stormwater management and waterway health:** Work with local government to improve stormwater management, waterway health, and amenity, particularly in urban infill and redevelopment areas.
- **Enhancing recreational use of waterways:** Support councils in increasing recreational use of waterways, including swimming.

Priority 5: Water management and services meet community needs

- **Community engagement and information sharing:** Continue engaging with the community about existing and proposed water services and supply options.

Sydney Water collaborates with the NSW Government to refine, update, and review the GSWS implementation plan. This process involves monitoring progress against milestones and targets and a broader evaluation of how well the priorities are being delivered. Since the GSWS's launch, Sydney Water and other relevant agencies have made significant progress in implementing the plan's actions. Annual reports on GSWS implementation are provided through the NSW Department of Climate Change, Energy, the Environment and Water's (DCCEEW) Monitoring, Evaluation and Review Report.

2.5 Sydney Water Aquatic Monitoring Program

Some information in this report refers closely to the outcomes of our 2023–24 Sydney Water Aquatic Monitoring (SWAM) Program Data Report (Sydney Water 2024). The SWAM program was developed by a review panel in consultation with the NSW EPA, NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW) and Sydney Water. A key focus of the review of the earlier program was to ensure that a revised monitoring program was able to differentiate the impacts of Sydney Water's activities from the impacts of all other anthropogenic activities occurring concurrently.

The SWAM program was endorsed by the NSW EPA in April 2023 to replace the Sewage Treatment System Impact Monitoring Program (STSIMP, Sydney Water 2010). The STSIMP was operational for 15 years (July 2008 to June 2023).

The SWAM program is now referenced in each of Sydney Water's wastewater Environment Protection Licences (EPLs). The key monitoring and reporting requirements are being gradually implemented from July 2023.

The overarching aim of the SWAM program is:

> '*to monitor the performance of Sydney Water's WRRF discharges and quantify the impacts (positive or negative) of these discharges, and sewer overflows and leakage, on the aquatic environment*'.

A key focus of the SWAM program is alignment with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG) 2018 water quality management framework (WQMF) to represent the nationally agreed process for managing, assessing and monitoring water quality. Amongst other aspects, it incorporates a weight of evidence (WoE) approach to water quality assessment that promotes the measurement of indicators from across the pressure, stressor and ecosystem receptor (P-S-ER) causal pathway elements (van Dam et al., 2023). For example, WRRF discharge quantity, quality and toxicity represent pressure indicators, while concentrations of key discharge constituents in the receiving waters represent stressor indicators, and phytoplankton and macroinvertebrate parameters represent ecosystem receptor indicators. This report also contains annual wastewater discharge quality, quantity, load and toxicity data with respect to EPL limits, and identify temporal trends of current year against the previous nine years and the trends in wastewater overflow, leakage and recycled water data with a special attention to compliance with EPL conditions and continuous improvement initiatives. The 2023–24 SWAM Program was provided to the NSW EPA on 15 December 2024 and published on Sydney Water's website in early 2025.

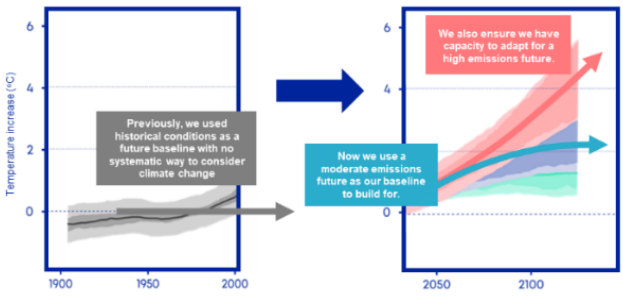
2.6 Weather and Climate change

Climate change continues to lead to more extreme, frequent, and compounding weather events. Globally, 2023–24 was the hottest year on record. Sydney Water's services and potential environmental impacts are interlinked with the prevailing climate. At the start of 2023–24, our environmental performance was affected by the return of average weather conditions, following a La Nina and an extended wet period the previous year. However, the onset of El Nino in September 2023 brought about drier than average conditions lasting until early 2024. During spring all sites across Greater Sydney received rainfall ranging between 54 per cent to 106 per cent of the long-term spring average. Rainfall against the average in summer ranged between 85 per cent (Cooranbong and Holsworthy) and 138 per cent (Mount Boyce).

In addition to the influence of natural drivers, anthropogenic climate change continues to influence climate and the likelihood of more extreme events as we plan for an uncertain future.

Sydney Water has formally adopted a position statement: that we will plan and invest prudently to ensure we can maintain service levels by managing our climate risk.

Figure 2-2 Position statement on climate change adaptation



Our position on adaptation is summarised in our climate change adaptation fact sheet. It requires our employees to work towards a future that explores different levels of emissions ranging from high to low. The standard we use is for a future with a moderate emissions pathway aligned with current global pledges. As shown in Figure 2-2, the adoption of this position is a change from previous practices which would rely on historical information. Sydney Water knows that there is no plausible future where the climate will behave as it has in the past, justifying this position statement.

Sydney Water will continue to adopt new methodologies to adapt to climate change, enabling us to be prepared in the face of a variable climate. New tools will be embedded into our planning and asset management practices to ensure we are planning for a future climate, not a past climate.

Sydney Water has developed a climate change adaptation guidebook to provide specific advice to our teams. This Guidebook outlines our position on climate change adaptation, Sydney specific hazard and impact information as well guidance on how to embed the position. It also provides tools to improve our existing risk management processes and implement the position in all key business processes.

We continue to use the Cross-Dependency Initiative (XDI) geo-spatial climate risk application to forecast risks and potential damage from climate hazards to our assets. We are also collaborating with external organisations and stakeholders to improve our understanding of compounding climate risks such as storms and sea-level rise.

In 2024 IPART published the Sydney Water Operating Licence 2024–2028, with a new condition (10.3), requiring climate-related planning and risk. This condition requires Sydney Water to implement an ongoing climate risk assessment and management process and demonstrate climate risk maturity consistent with the NSW Climate Risk Ready Guide. The licence condition requires Sydney Water, on the enterprise scale, meet an 'embedded' level of climate risk management maturity by 30 June 2027 and have made reasonable progress towards meeting an 'advanced' level by 30 June 2028.

Starting in 2025, Sydney Water is required to make climate-related disclosures for the preceding financial year. This report will detail our exposure to climate risks and opportunities, as well as our actions to manage them. The aim is to provide greater transparency, accountability and credibility in the way climate risks are managed. This is in line with climate-related financial disclosures obligations for Australia's large businesses and financial institutions.

3. Reduce impact of discharges to the environment

3 Reduce impact of discharges to the environment

Collecting and treating the community's wastewater plays an enormous role in protecting the environment from pollution and improving the health of our waterways. Our wastewater system has 30 Water Resource Recovery Facilities (WRRFs) and 14 of these facilities produce recycled water. All our wastewater systems are licensed by the NSW EPA. Our WRRFs receive wastewater from residential, commercial and industrial customers and discharge treated wastewater to inland waterways and the ocean. In 2023–24 Sydney Water collected 579,759 ML of wastewater, servicing an estimated population of 5,289,000 people. We produced 40,068 ML of recycled water that we supplied to a population of around 120,000 people, including environmental flows transferred from our Advanced Water Treatment Plant at St Marys to the Nepean River at Penrith.

3.1 Benefits of wastewater treatment

Healthy waterways are critical to the plants and animals. Our rivers are full of life, and maintaining flow is essential for their survival. Treating our wastewater not only protects public health but also protects habitats for terrestrial and aquatic life. Water also has scenic and recreational values and contributes to the quality of life that communities can enjoy, including water activities such as swimming, fishing, boating and picnicking. In 2023–24 we treated 136,523ML wastewater to tertiary level before discharging to receiving waterways.

Sydney Water collaborated with platypus experts and specialist landscape and waterway designers Thompson Berill Landscape Design (TBLD) to develop and incorporate platypus-friendly design measures in the Boundary Creek stabilisation works. The channel design will incorporate safe passage, shelter and foraging opportunities for platypus through Boundary Creek following stabilisation works. A unique purpose-built platypus bypass swale was designed and constructed to allow alternate platypus friendly passage during construction of the stabilisation works in the creek.

3.1.1 Strategic Investment Plan for Environmental Protection

Sydney Water has new Strategic Investment Plans (SIPs) commencing in 2025–26 to show how over the next 10 years we will achieve our strategy and vision to create a better life with world-class water services. Environmental Protection is one of the five SIPs. This Strategic Investment Plan sets out how we will deliver on our Environmental Protection outcome to ensure we protect our waterways and environment now and for the future, focused on five objectives:

1. Prevent pollution
2. Recover resources
3. Cool, green and natural places
4. Net zero carbon emissions
5. Climate resilient systems.

3.1.2 Impacts on swimming locations

The water quality of beaches and other swimming locations is monitored under the NSW Government's Beachwatch programs. Beachwatch suitability grades provide an assessment of the suitability over time of a swimming location for recreation. There are five grades ranging from Very Good to Very Poor.

In 2023–24, the Beachwatch program (DCCEEW and Sydney Water) monitored 115 sites within the Sydney Water area of operations. There were 936 observations where Enterococci (measured in colony forming units per 100 mL(cfu/100mL)) levels were above the primary contact guideline (>35 cfu/100 mL) at beach and harbour sites. Avalon Beach and Whale Beach from Northern Sydney, and Fishermans Beach and Wollongong Beach from Wollongong were the only sites where *Enterococci* levels were below the primary contact guideline throughout the year. Out of the 936 observations, 317 dry weather exceedances were assessed based on high conductivity (>30,000 µS/cm) and no rainfall (72 hours rainfall <2mm). These 317 dry weather exceedances were from 87 beaches and investigated further. The investigation focused on assessing data collected under Sydney Water's Environmental Response (ER) and Dry Weather Leakage Program (DWLP). All data was extracted and then filtered by sites that exceeded the primary contact guideline. The site list was rationalised to include only wastewater inflow points – the point at which an overflow reaches a waterway – or any site sampled that is

deemed to be a primary or secondary contact waterway. The sampling information was then mapped against the 317 Beachwatch exceedances. Any site sampled under the ER or DWLP projects that met the above criteria and occurred within seven days before and seven days after the Beachwatch exceedance was deemed to have a potential impact.

Table 3-1: Summary of Beachwatch Program changes in suitability grade for sites potentially impacted by Sydney Water's operations in 2023–24 and 2022-23 based on known dry weather overflows

Site and site names	Potential impact from wastewater overflows 2023–24	Potential impact from wastewater overflows 2022–23	Beach suitability grade 2019–20	Beach suitability grade 2020–21	Beach suitability grade 2021–22	Beach suitability grade 2022–23	Beach suitability grade 2023–24
Sydney Beaches							
Bilarong Reserve	Yes						
Boat Harbour	Yes						
Bronte Beach	Yes						
Malabar Beach	Yes						
Maroubra Beach	Yes						
Narrabeen Lagoon (Birdwood Park)	Yes						
Sydney harbours and estuaries							
Bayview Baths		Yes					
Carss Point baths	Yes	Yes					
Chinamans Beach	Yes	-					
Clontarf Pool	Yes	-					
Como Baths	Yes						
Dolls Point Baths		Yes					
Dawn Fraser Pool		Yes					
Foreshore Beach	Yes	Yes					
Gymea Bay Baths		Yes					
Hayes Street Beach		Yes					
Horderns Beach		Yes					
Jew Fish Bay Baths		Yes					

Site and site names	Potential impact from wastewater overflows 2023–24	Potential impact from wastewater overflows 2022–23	Beach suitability grade 2019–20	Beach suitability grade 2020–21	Beach suitability grade 2021–22	Beach suitability grade 2022–23	Beach suitability grade 2023–24
Jibbon Beach	Yes		Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade
Kyeemagh Baths	Yes	Yes	Good or Very Good Grade	Needs Improvement (Poor or Very Poor Grade)	Needs Improvement (Poor or Very Poor Grade)	Needs Improvement (Poor or Very Poor Grade)	Needs Improvement (Poor or Very Poor Grade)
Lilli Pilli Baths	Yes		Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade
Monterey Baths		Yes	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade
Murray Rose Pool	Yes	Yes	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Needs Improvement (Poor or Very Poor Grade)
Oatley Bay Baths	Yes		Improved	Improved	Declined	Needs Improvement (Poor or Very Poor Grade)	Needs Improvement (Poor or Very Poor Grade)
Parsley Bay		Yes	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade
Sandringham Baths		Yes	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade	Good or Very Good Grade
Woolwich Baths	Yes	-	Good or Very Good Grade	Good or Very Good Grade	Declined	Declined	Needs Improvement (Poor or Very Poor Grade)
Total number of impacted sites	**17**	**14**					

Legend: Needs Improvement (Poor or Very Poor Grade); Good or Very Good Grade; Improved; Stable; Declined

Source :Beatchwatch Program 2023-24 (DPIE)

Using the above methodology for 2023–24 data, dry weather wastewater overflows from Sydney Water's networks may have contributed to elevated Enterococci at 17 of the 115 Beachwatch sites (15 per cent of all sites) on 31 occasions (Table 3-1). Eight of these sites had only one dry weather overflow incident. There were two incidents at Bilarong Reserve, Narrabeen Lagoon (Birdwood Park), Boat Harbour, Kyeemagh Baths, Clontarf Pool, and Murray Rose Pool; three incidents at Como Baths and Oatley Bay Baths; and five incidents at Foreshores Beach during 2023–24, where Sydney Water's network may have contributed to these exceedances.

DCCEEW (DCCEEW 2023 and DCCEEW 2024) determined that over the last two years, 27 wastewater overflows impacted sites and respective beach suitability grades (Table 3-1). The beach suitability grades deteriorated at two of these sites and were stable at the remaining sites compared to the 2022–23 results.

- Four of the sites were impacted by wastewater overflows for the last two consecutive years. These were Carss Point Baths, Foreshore Beach, Kyeemagh Baths and Murray Rose Pool.
- The three sites where beach suitability grades deteriorated in 2023–24 were impacted by wastewater overflows (Boat Harbour, Bronte Beach and Murray Rose Pool). Out of these three, only Murray Rose Pool was impacted in 2022–23.

Sydney Water is progressing works to reduce the wastewater overflows to the mouth of the Mill Stream that affect Foreshore Beach. This includes removal of the silt in the local trunk sewer to restore capacity and an extensive program of stormwater inflow reduction works across the Malabar Wastewater System.

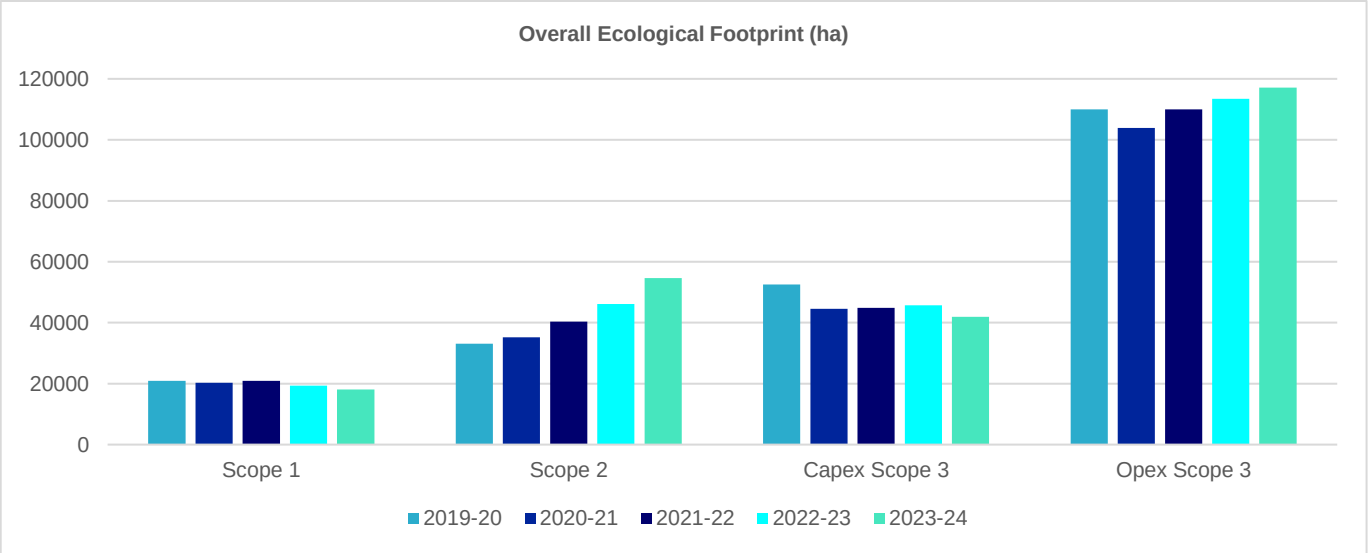
Caring for and protecting the environment is a core value in everything we do at Sydney Water

3.2 Ecological footprint

We continued to calculate our ecological footprint (Figure 3-1) and carbon footprint (Figure 3-2). The ecological footprint methodology combines detailed direct organisation impacts (Sydney Water land use data, scope 1 and scope 2 emissions) with full supply-chain carbon emissions (scope 3 sources including Sydney Desalination Plant and WaterNSW) and all supplier land disturbance impacts, to yield a comprehensive ecological (and carbon) footprint measurement.

In 2023–24, our total ecological footprint (EF) from all sources (including direct, indirect, and Scope 1, 2 & 3 emissions) was 117,000 ha, representing an approximate 3 per cent increase over the total compared to 2022–23. This is part of a general increasing trend, shown below in the five-year time series of the main EF components. The direct emissions-equivalent EF (Scope 1) has fallen significantly in the last two years compared to the previous three years. The electricity-related EF (Scope 2) has also fallen steadily, by approximately 14 per cent over the five-year period.

Figure 3-1 Ecological Footprint 2023–24



3.3 Embracing circular economy

Sydney Water's vision to create a better life with world-class water services recognises that managing our water, carbon, materials and nature in a circular way is essential to a thriving city ecosystem. We will realise this by delivering better outcomes through designing out waste and pollution, keeping resources in use at their highest value, and by creating integrated water solutions that will restore and regenerate natural systems. To achieve this, Sydney Water is continuing to extend our partnerships with customers, businesses, communities and all levels of government.

Sydney Water provides a wide range of water services by supplying water, wastewater, recycled water and some stormwater services. This range offers a variety of circular economy applications. In 2023–24, Sydney Water developed strategic measures and targets to drive the organisation's commitment to circular economy. This aligned with the existing

ongoing monitoring of PFAS and potential regulatory changes to guide resource recovery strategies.

Sydney Water is currently constructing one of the Southern Hemisphere's most advanced wastewater recycling facilities – the Upper South Creek Advanced Water Recycling Centre (AWRC) in Kemps Creek of the Western Parkland City. Adjacent to this site, a 12-hectare land parcel known as the Circular Economy Zone (CEZ) is available to Sydney Water. Envisaged as an eco-industrial precinct that substantially expands the site's utility, the CEZ presents an opportunity to leverage the AWRC investment by harnessing industrial symbiosis for water, energy and materials. Sydney Water's key objective for the CEZ is to activate the circular economy by unlocking the value of the site through suitably aligned industries who will bring best practice, innovative thinking and a collaborative approach to deliver this project. In 2023–24, after exploring different business models and development opportunities for the site, Sydney Water's senior management endorsed the CEZ to progress to market sounding.

As a major infrastructure agency, the management of construction materials is a crucial aspect of the delivery of new or renewing existing Sydney Water's assets. Efficiency is key to maintain the schedule, and budget of a project. Often, materials are procured or produced more than a project's specific requirements. Up until now, any spare materials would often be discarded. The introduction of a new Materials Sharing Register this year is making the beneficial reuse of materials on another project site possible in a systemic and easy-to-use way. Use of this register across project sites results in cost savings, reduced lead times and will promote environmental sustainability and responsible resource management.

Malabar Biomethane Injection Project is the first biomethane injection project in Australia. The plant commissioned in July 2023 demonstrates the opportunity found in Australia's biomethane potential and offers a technical blueprint for future biomethane facilities across the country. The plant supports and facilitates the development of Australia's biomethane industry. Lessons learnt have been identified for each project phase to enable knowledge sharing with Australian Renewable Energy

Agency (ARENA) and other industry stakeholders. In March 2024 it became the first renewable gas facility to be registered under GreenPower's Renewable Gas Certification Scheme. Demonstrating the technical and economic viability of Australian biomethane projects will support establishing realistic renewable gas targets to aid in expanding renewable gas assets across Australia. Furthermore, the registration under GreenPower's Renewable Gas Certification Scheme plays an important role in developing a standard for future biomethane production and injection projects in Australia.

The macroalgae trial at Picton Water Resource Recovery Facility has demonstrated excellent water quality can be achieved without using more energy intensive treatment systems, without producing brine and without chemicals. The trial has performed reliably, over more than 12 months, to reduce the levels of nitrogen, ammonia, phosphorus and harmful bacteria as well as metals. Higher flow rates and a range of inflow pollutant concentrations have helped Sydney Water to understand the performance to be expected at larger scale (to polish secondary treated wastewater). The algae grown in the raceways can be beneficially reused to return nutrients to the soil (biostimulant / fertiliser) or to generate energy (biomethane/bioethanol) and even to make new materials (bioplastics / cellulose applications / biorefinery models).

The wetland trial has characterised the lowest "background concentrations" that can be achieved with either floating wetlands or surface flow wetlands to reduce pollutants in

wastewater. Regular monitoring has demonstrated the reliability of the systems with results now available for a three- year period. Intensive testing will be completed in 2025 and will help us simulate performance to understand the size and cost of these systems. Both wetland types, floating and surface flow, have demonstrated very low operational cost.

3.4 Net Zero Carbon

Sydney Water's circular economy approach will help us achieve Net Zero Carbon. Sydney Water's strategy recognises the importance of climate change abatement to enable our environmental protection strategic outcome. As part of our response to climate change, we have an internal target of Net Zero Carbon across our business by 2030, and across our supply chain by 2040. We have established a pathway to achieving net zero carbon emissions by 2030. Key initiatives include Power Purchase Agreements (PPA) that cover 57 per cent of our carbon emissions and offsets contributing 24 per cent towards our goal. A carbon offset acquisition plan is being developed to ensure we can secure the necessary Australian Carbon Credit Units (ACCUs) to achieve our net zero target by 2030. We plan to reduce our net zero emissions through renewable energy projects– particularly resource recovery in the form of self-generating renewable energy. We are working with our suppliers to ensure we reach our Net Zero Carbon goal by 2040. Some of our suppliers already measure their emissions and have their own net zero plan in place. The Greenhouse Gas Estimation Tool has been rolled out to be used for projects during planning, design and delivery. The carbon emissions can be assessed and opportunities to reduce emissions identified.

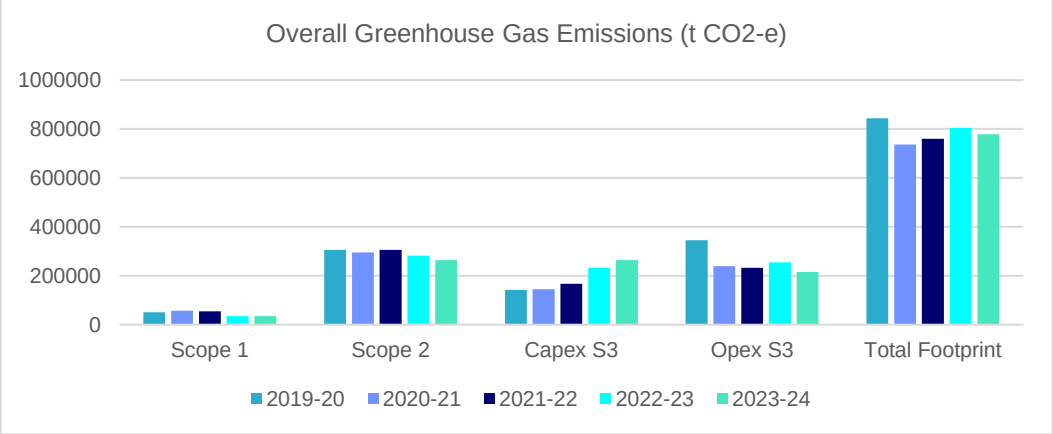
The total carbon footprint for 2023–24 was 778,000 tCO2-e (Scope 1, 2 and all Scope 3), with the breakdown shown in Figure 3-2 at 3 per cent lower compared to 2022–23. Scope 2 emissions (electricity) and emissions from capital expenditure, being both 260,000 tCO2-e, were the two largest components in the total emissions. Scope 1 (direct) emissions have declined by approximately 20,000 t CO2-e compared to the long-term average over the past 2 years, due to revisions in the measurement methodology. Scope 2 emissions have also fallen steadily over the last three years despite electricity consumption increasing – due to the reduction of the NSW grid electricity emissions factor. The electricity emissions factor drop is also embedded in estimates for Scope 3 emissions through CAPEX and OPEX. With the fall in Scope 1 and 2 emissions over the last two years, Scope 3 emissions now form 62 per cent of the total footprint.

Our Scope 3 emissions have important components from WaterNSW and the Sydney Desalination Plant (SDP). Electricity emissions associated with bulk water supply in 2023–24 were similar again to 2019–20 and 2020–21. Whilst the supply to the SDP is regarded as being 100 per cent renewable electricity, in formal greenhouse accounting terms there are still emissions associated with the plant's use of electricity. The near halving of the volume of desalinated water delivered in 2023–24 resulted in a large fall in the SDP emissions.

Although there are many small components which collectively are significant, the important main contributions to Scope 3 Operational expenditure emissions are from:

- chemical purchases
- maintenance activities, such as asset repairs and equipment upgrades
- road freight of goods
- embodied carbon in building materials and technical services.

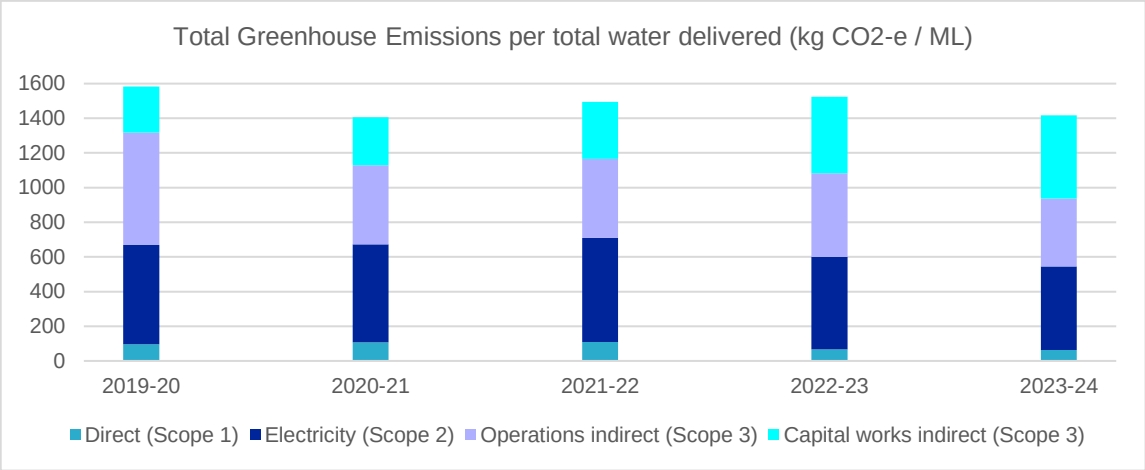
Figure 3-2 Carbon footprint 2023–24



Normalised carbon footprint

It is instructive to normalise the various annual footprint results by Sydney Water activity measures. As a guide, over the last five years average annual drinking water supplied is about 513 GL to 5.3 million people, covering about 2.1 million properties. There are year-to-year variations due to climate and socioeconomic factors (including COVID-19). The average annual drinking water use per person ranged from 97 to 102 kL over the five-year period. Despite many changes inherent in a five-year total carbon footprint history including substantial increase in capital expenditure being the most influential component, the normalised total carbon footprints shown below (Figure 3-3) are constant. Over the period of these results, the total carbon footprint varied between 1.4 and 1.6 t CO2-e per megalitre of delivered water, with the increases from capital expenditure being offset by general falls in the other components, particularly in the last financial year.

Figure 3-3 Greenhouse emissions per total water delivered 2023–24



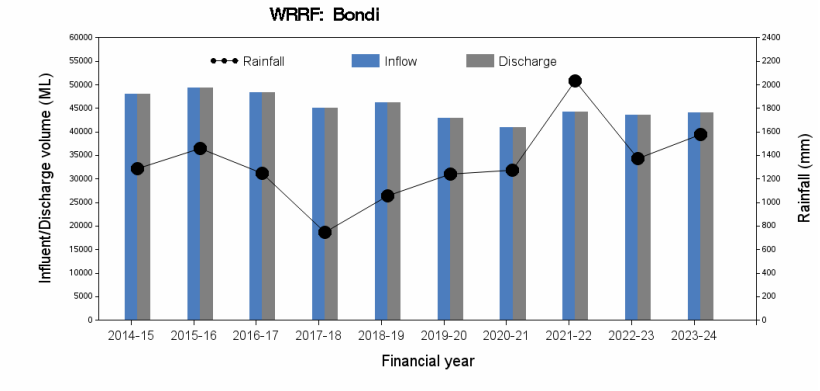
3.5 Wastewater treatment discharges – coastal facilities

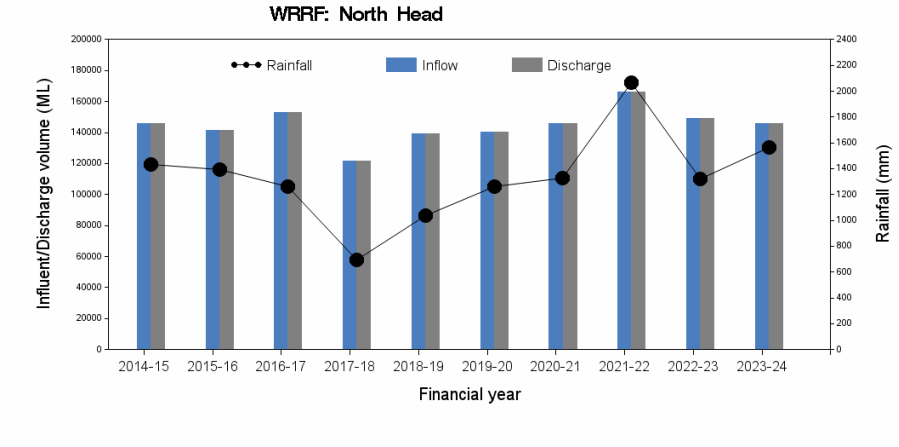
About 85 per cent of wastewater collected by Sydney Water is treated at Water Resource Recovery Facilities (WRRFs) before being released to the ocean. There are three major coastal WRRFs located at North Head, Bondi and Malabar and five smaller coastal facilities at Warriewood, Cronulla, Bombo, Wollongong and Shellharbour. We treat about 64 per cent of Sydney's wastewater at the three largest WRRFs. These three major facilities disperse primary treated wastewater through the three deep ocean outfalls about two to four km offshore, where the water is 60 to 80 m deep. Strong ocean currents further dilute the treated wastewater. The deep ocean outfalls play a key role in keeping our beaches and swimming areas clean (Manning et al, 2019).

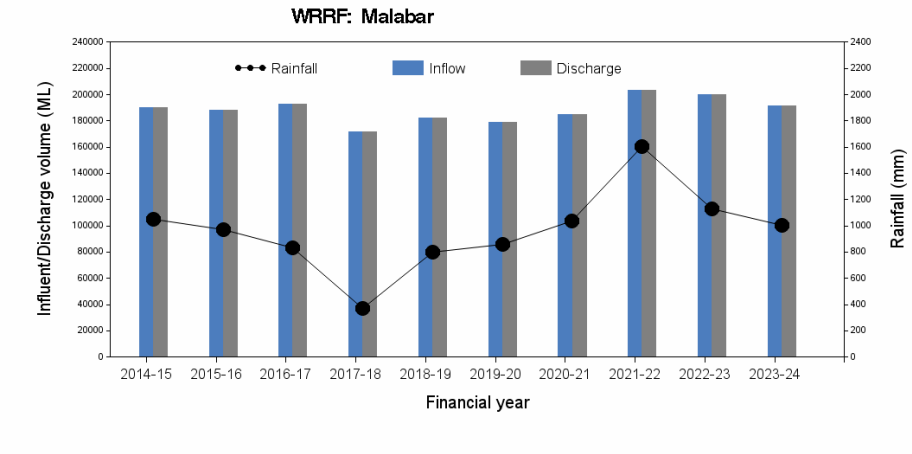
3.5.1 Inflow

The 2023–24 reporting year returned to more typical rainfall levels, following an extraordinary wet year in 2021–22 and less wet year in 2022–23 (Figure 3-4).

Figure 3-4 Deep ocean outfalls WRRFS inflow and discharge



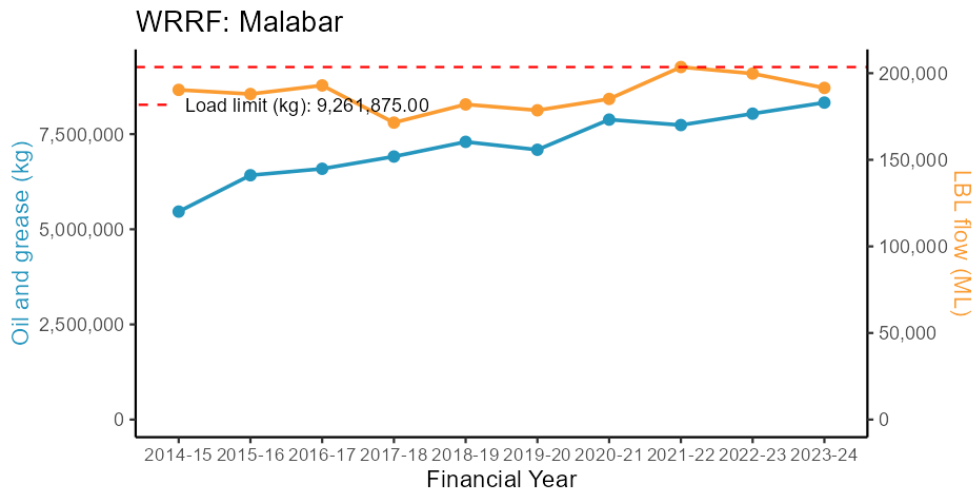




3.5.2 Oil and grease

The oil and grease concentration in the discharge from North Head WRRFs was similar to the previous year. Bondi WRRF showed a slight increase and Malabar WRRF showed an increasing trend compared to the previous nine years (Figure 3-5) (refer to the SWAM 2023–34 data report for further details). The increasing trend at Malabar WRRF is linked to a combination of population growth in the catchment and successful reduction of saltwater ingress into the wastewater network. Sydney Water is initiating projects to improve scum and sludge removal efficiency at Malabar WRRF. Sydney Water is continuing to collaborate with the community and trade waste customers through community educational programs to reduce oil and grease discharges into the Sydney Water wastewater network.

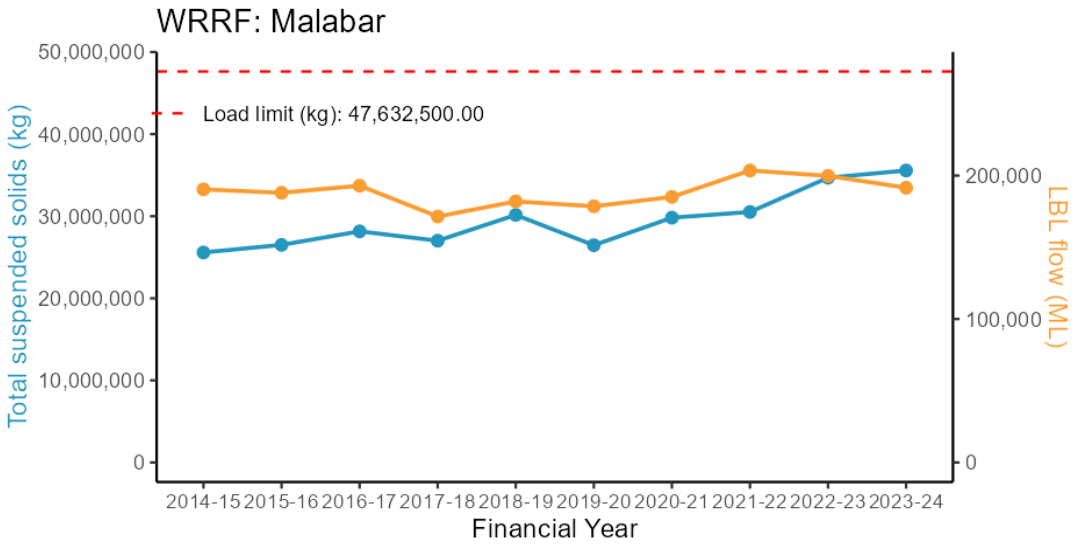
Figure 3-5 Malabar WRRF oil and grease load



3.5.3 Total suspended solids

There was minimal change in the total suspended solids (TSS) discharged from North Head WRRF compared to the previous year, while Bondi WRRF showed a decreasing trend. The increasing suspended solids trend at Malabar WRRF (Figure 3-6) can be linked to reduced capability of the sedimentation and solids capture system. Sydney Water is addressing this issue by undertaking major periodic maintenance on primary sedimentation assets.

Figure 3-6 Malabar WRRF total suspended solids load



3.6 Wastewater treatment discharges – inland facilities

About 16 per cent of wastewater collected by Sydney Water is treated at inland WRRFs. Most of our inland facilities discharge into the Hawkesbury-Nepean River system. Considerable urban growth is occurring across the Hawkesbury-Nepean catchment and is expected to continue for at least 30 years to accommodate Sydney's growing population. This provides the opportunity to deliver water services in new and better ways.

To understand the potential impacts of population growth to wastewater services and the environment, we use our water quality and hydrodynamic model of the Hawkesbury-Nepean catchment to test different catchments, environmental flows, wastewater and land-use options over time.

We are working collaboratively with the NSW EPA to implement the regulatory framework for nutrient discharges into the Hawkesbury-Nepean River system. The objectives of this regulatory framework are to manage nutrient load inputs to the Hawkesbury-Nepean River from WRRFs at a level that contributes to meeting communities' environmental values for the river. The insights from our Hawkesbury-Nepean water quality and hydrodynamic model will enable smarter solutions to achieve the regulated framework requirements. Community involvement and the new regulatory framework will drive the best balance of social, economic and environmental outcomes for the Hawkesbury-Nepean catchment area. The new framework will be implemented from 1 July 2025.

3.6.1 Total nitrogen and total phosphorus

Treated wastewater discharge limits for total nitrogen and total phosphorus loads from Sydney Water and Hawkesbury City Council are divided by WRRFs discharging into three river zones and several subzones. The WRRFs in these zones and the subzones are presented in Table 3-2, the ten-year trend for total nitrogen and total phosphorus in inland WRRFs is shown in Figure 3-7Figure 3-7 and Figure 3-8Figure 3-8.

3.6.1.1 Total nitrogen load discharge exceedances

Picton (Yarramundi Zone – Subzone 1) total nitrogen load was 4,839 kg (compared to the limit of 4,400 kg). Picton WRRF experienced increased inflow and reduced opportunities for irrigation due to high rainfall in the second half of the year. This also

increased the transfer of partially treated effluent to the onsite Western Dam to minimise uncontrolled discharges from the onsite Eastern Dam.

A significant decrease in total nitrogen at **Winmalee WRRF** was seen due to plant upgrade works.

3.6.1.2 Total phosphorus load discharge exceedances

Winmalee WRRF experienced an increased trend in total phosphorus load whilst the plant was functioning under reduced process capacity.

South Creek Bubble facilities (Riverstone, St Marys and Quakers Hill WRRFs) exceedances were largely due to wet weather events in the catchment between January and April 2024, with all three facilities within the South Creek Bubble operating under wet weather conditions. St Marys WRRF contributed to 37.4 per cent, Quakers Hill contributed to 58.7 per cent and Riverstone contributed to 4.1 per cent of the total phosphorus load from these three South Creek Bubble facilities.

Sydney Water has commenced discussions with the NSW EPA on reviewing concentration and load limit exceedances associated with rainfall events, including the initiation of environmental assessments at five WRRFs (St Marys, Hornsby Heights, West Hornsby, Quakers Hill and Wollongong).

Table 3-2: Total load of nitrogen and phosphorus (kg) from inland WRRFs discharged into the Hawkesbury-Nepean catchment zones over 2023–2024

Zones	WRRF	Total Nitrogen (kg)			Total Phosphorus (kg)		
		Limits	Actual		Limits	Actual	
			2022–23	2023–24		2022–23	2023–24
Yarramundi Zone							
Subzone 1	West Camden	91,980	115,901	83,910	2,190	990	936
	Picton	4,400	4,322	4,839	80	136	64
Subzone 2	Winmalee	110,595	88,553	40,334	6,687	4,389	5,164
	Penrith	176,660	18,590	29,904	8,030	1,089	1,022
	Wallacia	12,410	2,137	2,549	1,606	37	38
Sackville Zone							
Subzone 1	Richmond	43,800	5,420	4,533	10,877	24	16
	North Richmond	7,118	3,076.2	4,114	803	105	173
Subzone 2	(South Creek Bubble)	222,000	144,993	167,094	2,300	3,049	3,598
	Riverstone	N/A	20,122	24,321	N/A	112	142
	St Marys	N/A	46,269	73,062	N/A	990	1,345
	Quakers Hill	N/A	78,603	69,711	N/A	1,947	2,111
Subzone 3	Castle Hill	72,270	37,818	40,316	2,300	1,075	634
	Rouse Hill	124,100	60,352	49,343	4,453	213	259
Berowra Zone							
	Hornsby Heights	72,270	13942	9,515	2,300	409	257
	West Hornsby	80,300	22375	16,494	4,643	1061	356

Red indicates exceedances

Figure 3-7 Total nitrogen load released from inland WRRFs

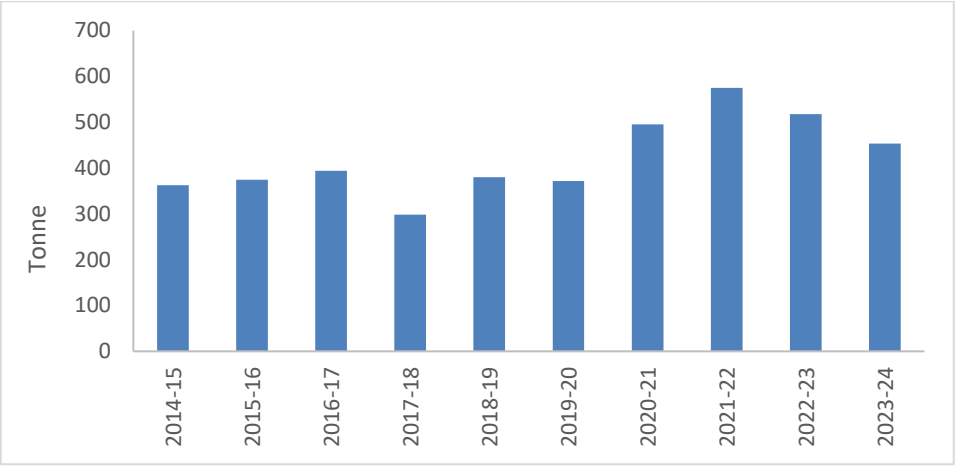
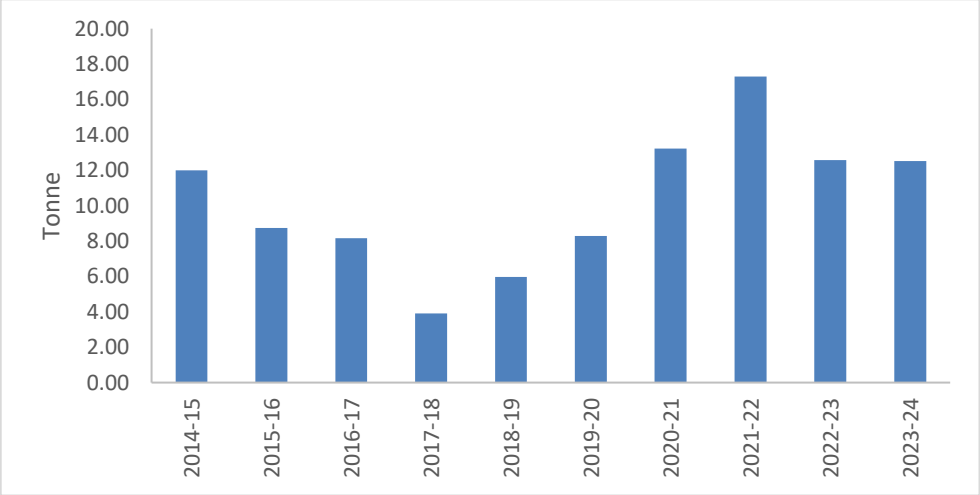


Figure 3-8 Total phosphorus load released from inland WRRFs



3.6.2 Hawkesbury-Nepean water quality and ecosystem health

The Hawkesbury-Nepean River system is one of the longest coastal rivers in eastern Australia with a catchment area of approximately 22,000 km^2. Distinguishing the impacts associated with Sydney Water's WRRF discharges to the Hawkesbury-Nepean River system from other pressures requires a strong focus on monitoring stressors and ecosystem receptors both upstream and downstream of the WRRF discharges, where possible. However, it is also known that the impacts of nutrient inputs on phytoplankton do not necessarily occur immediately downstream of WRRF discharges, as physical factors like stream and river morphology, flow rate, and light penetration are also important determinants of the potential for phytoplankton growth. Thus, maintaining a surveillance on locations known to be susceptible to high phytoplankton growth is still important, even if the exact causes of such events cannot be fully separated. This sub-program is intended to:

- Assess the direct impacts of Sydney Water's Hawkesbury-Nepean River WRRF discharges on water quality, and ecosystem health as measured by responses of phytoplankton and macroinvertebrates.
    - Stressors: the design focuses on stressors and ecosystem receptors from, where possible, paired sites upstream and downstream of 14 WRRF discharges, to directly assess the impacts of the discharges.
    - Ecosystem receptors (phytoplankton): assessment of stressors and ecosystem receptors chlorophyll-a as an indicator of phytoplankton at 18 sites and phytoplankton cell count and biovolume at ten long-term sites located throughout the Hawkesbury-Nepean River system that are known to be susceptible to high phytoplankton growth (Figure 3-9).

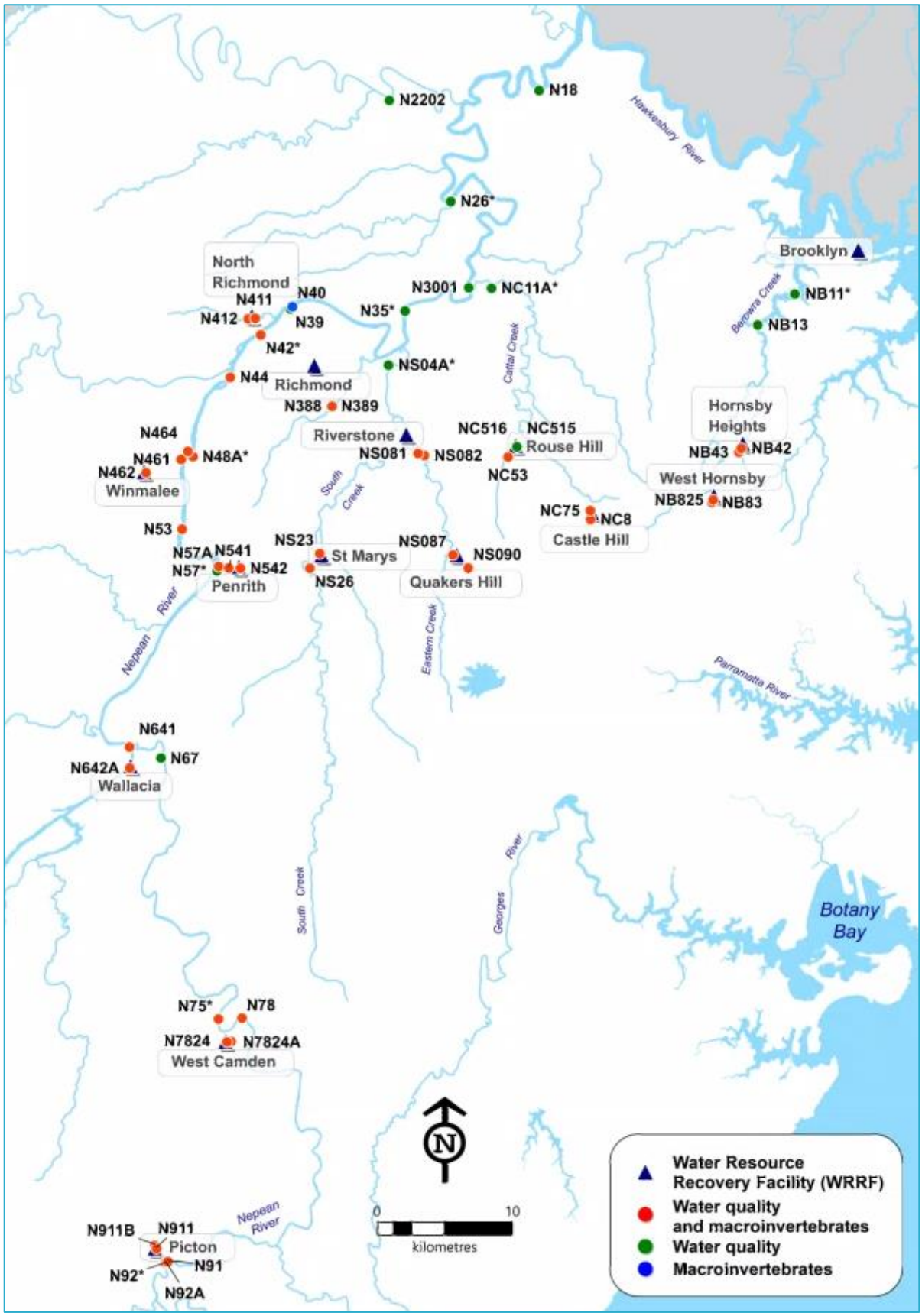
- Ecosystem receptors (macroinvertebrates): collected on a bi-annual basis every autumn and spring.

- Characterise water quality and phytoplankton community characteristics at selected sites in the Hawkesbury-Nepean River and tributaries susceptible to higher algal abundances.

Water quality and ecosystem health

The receiving water quality and phytoplankton data for 40 upstream and downstream monitoring sites (20 site pairs) associated with 14 Hawkesbury-Nepean River WRRFs were assessed to:

Figure 3-9 Receiving water monitoring sites for the Hawkesbury-Nepean River water quality and ecosystem health sub-program



- determine temporal trends (increasing, decreasing or steady) in 2023–24 compared to previous two to nine years.
- compare the 2023–24 median results against national guidelines and trigger values where available.
- make statistical comparisons between upstream and downstream monitoring results (for the 2023–24 year) and identify possible links with upstream influences, like WRRF discharges.

The second half of 2023–24 year was dominated by above average rainfall throughout the Hawkesbury-Nepean River catchment, with the most intensive events between December 2023 and June 2024. The total rainfall ranged from 746 mm (upper Nepean River catchment) to 1,291 mm (Berowra Creek catchment). The impact of wet weather, along with the increasing and decreasing trends in the concentration of nutrient analytes in the discharge from some of Sydney Water's WRRFs might have influenced the nutrient concentrations at the downstream receiving water sites.

The upstream versus downstream comparison (2023–24) also indicated:

- chlorophyll-a concentrations at the upstream sites were significantly higher than downstream for two WRRFs in West Camden and Penrith, indicating localised conditions upstream that favour phytoplankton growth like low flow, high nutrient availability.
- stream health outcomes, as indicated by macroinvertebrates, showed localised ecosystem impacts in tributaries downstream of six of 14 WRRFs. These included Picton, West Camden, Winmalee, North Richmond, Castle Hill and Hornsby Heights. For Penrith, St Marys and Quakers Hill WRRFs, upstream ecosystem health was poorer compared to downstream health.
- Sydney Water is committed to reducing pollutant concentrations being discharged into the Hawkesbury-Nepean River through key initiatives and programs including upgrade works at West Camden, Penrith, Winmalee, Richmond, St Marys and Quakers Hill WRRFs to improve nutrient removal. The Winmalee upgrade was completed in late 2024. The remaining WRRFs are expected to be completed by the end of 2026. Further upgrades to Castle Hill, Rouse Hill and Riverstone are being planned.

3.6.3 Georges River water quality and ecosystem health

The Georges River drains a catchment of approximately 1,000 km^2 to the south-west of Sydney. Again, distinguishing impacts associated with Sydney Water's WRRF discharges to the Georges River system from other pressures requires a strong focus on monitoring of stressors and ecosystem receptors both upstream and downstream of the WRRF discharges, where possible. This is straightforward for the Glenfield WRRF, which is located in a freshwater, non-tidal reach of the Georges River. However, it is challenging for the Liverpool and Fairfield WRRFs, which are located in the upper tidal estuarine reaches, where the tidal influence prevents a typical upstream and downstream site design from being used. Moreover, unlike the standard use of macroinvertebrates as ecosystem receptor indicators for freshwaters, there are currently no such standard methods for estuarine invertebrates. The constraints associated with effective impact monitoring for the Liverpool and Fairfield WRRFs were discussed by van Dam et al. (2023). This sub-program focuses only on the Glenfield WRRF discharge, and is to:

- assess the direct impacts of Sydney Water's Glenfield WRRF discharges on water quality and ecosystem health as measured by responses of phytoplankton and macroinvertebrates.

The receiving water quality and phytoplankton data for three upstream and downstream monitoring sites for Glenfield WRRF were collected for the first time during the 2023–24 period. Statistical analysis will be included in SWAM reports from 2024–25 to further validate these trends. Stream health, as indicated by macroinvertebrates, was not assessed because of insufficient data, as monitoring commenced in 2023–24. Statistical analysis will be included in SWAM reports from 2024–25 alongside water quality outcomes.

3.7 Water and wastewater network discharges

We supply water and recycled water through over 23,686 km of pipes,165 pumping stations and 261 reservoirs. Our wastewater network consists of over 26,861 km of pipes and 698 wastewater pumping stations. We control over 456 km of stormwater channels. Weather conditions present challenges in managing this extensive network. During heavy rain, stormwater can enter the wastewater network through incorrect private connections and cracked pipes. Our network is designed with additional capacity to cope with higher flow during wet weather. However, if the combined wastewater and stormwater flow travelling through the network exceeds the capacity of the network, wastewater will be released to local waterways via designated emergency relief structures. This is called a wet weather overflow. These overflow points prevent wastewater from backing up into our customer's homes and businesses. During dry weather, due to dry soil conditions, tree roots seeking moisture enter through the pipes and cause blockages, which often result in dry weather overflows. Tree roots are the most common cause of blockages in the wastewater network.

Inappropriate disposal of material into the wastewater network exacerbates these blockages as tree roots capture these solids. Inappropriately disposed items in our wastewater network include wipes, sanitary products, oil and grease and construction debris.

3.7.1 Dry weather overflows

Tree roots are the most common cause for blockages in the wastewater network. Pipe blockages due to structural faults are a small fraction of the total causes. Dry weather overflow volumes are measured when an incident is declared by Sydney Water. The total number of overflows, the estimated overflow volume and the proportion that reaches a receiving waterway in each Sewer Catchment Area Management Plan (SCAMP) are reported to the NSW EPA in our Annual Returns for each EPL. Each EPL has specified limits on the number of dry weather overflow incidents reaching waterways (Condition L7.4). Twelve systems have Condition L7.4 System Limits specified in their EPLs. Among these, three were under or equal to their limits in 2023–24 (compared to eight in 2022–23) while the remaining nine systems exceeded their EPL limit (compared to four in 2022–23).

During 2023–24 eight ocean wastewater systems discharged 21.2 ML of wastewater from network dry weather overflows, whilst 11 large inland wastewater systems discharged 2.2 ML of wastewater from network dry weather overflows (Figure 3-11). There were no dry weather overflows recorded from the remaining four small wastewater system networks (Wallacia, Picton, North Richmond and Brooklyn). The total volume of wastewater from dry weather overflows in 2023–24 from our inland wastewater catchments increased by 152 per cent and from the ocean catchments increased by 59 per cent compared to year 2022–23.

In 2023–24, Sydney Water experienced 11,220 blockages across our wastewater networks in relation to dry weather overflows (Sydney Water, 2023a). This was a 47 per cent increase in network blockages compared to 2022–23. The increase from 2022–23 is largely due to a shift towards typical El-Nino climatic conditions with lower rainfall and decreased soil moisture. The total number of wastewater overflows reaching waterways from these blockages was 487, contributing to 4.3 per cent of total overflows. This was a 71 per cent increase when compared to 284 overflows reaching waterways in 2022–23. The five-year average (2019–24) of chokes per 100 km was 44,below the limit of 81.

Chokes are caused by material blocking a pipe or sewer structure. Sydney Water response crews record the material most responsible for causing a blockage as the cause. In most cases there is a combination of causes (Table 3-3). Small diameter pipes (150 mm and 225 mm) are more than 80 per cent of the sewerage system and are also the most prone to chokes.

Table 3 3: Relative percentage of choke causes for 2023–24

Cause	Contribution	Description
Tree roots	45.4%	Tree roots entering through cracks, joints, and private sewers
Soft choke	22.1%	Combination of residual solids, wet wipes, and sanitary products
Debris	15.9%	Debris from construction activity broken pipes and non-flushables
Fat / Grease	9.2%	Consolidated fat on pipe walls residential and commercial sources
Structural	3.2%	Issues with the actual pipes such as collapses
Non-specific	2.5%	Includes Other, Unknown and Source Unknown and missing data
Uncommon	1.7%	Several uncommon causes including some caused by customers

Key initiatives and improvement strategies for dry weather overflows including abatement activities and corrective actions

The key initiatives and improvement strategies that were undertaken in 2023–24 include scheduled investigations, works and activities to reduce the increased volume and frequencies of dry weather overflows. These are described below.

Reactive responses to overflows

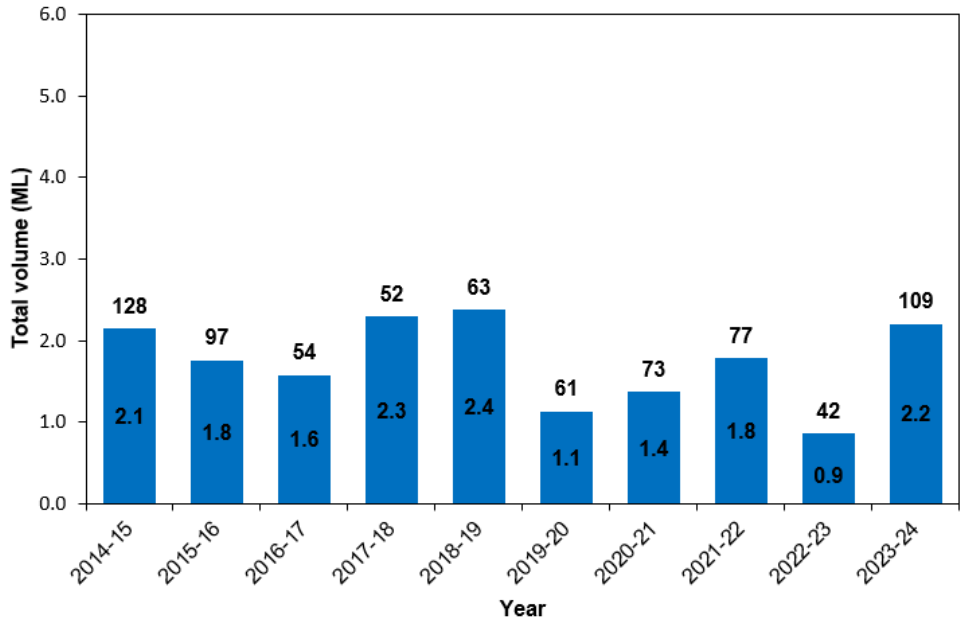
Maintenance field crews provide a reactive environmental response to sewer chokes across our area of operations. This involves establishing pollution controls (like containment, signage, cordoning), clearing of blockages (mainly using high-pressure water jetting equipment) and clean-up. Timely and effective containment can prevent an overflow from reaching a waterway.

Maintenance Hole Inspection Program – We completed 12,852 maintenance hole inspections conducting assessments of pipes and maintenance structures likely to block and overflow to a waterway.

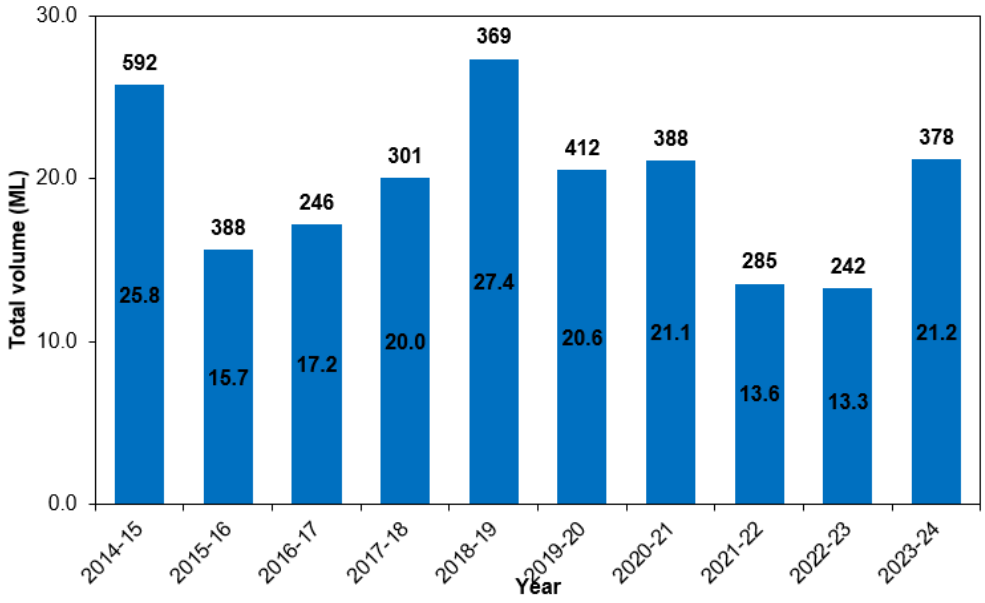
CCTV Level 1 and Level 2 – Dry weather overflow abatement investigation involves visual inspection of maintenance

Figure 3-10 Previous 10 years of dry weather overflow volumes by all ocean and inland wastewater systems and number of incidents

Inland WRRFs



Ocean WRRFs



structures and remote inspection of pipes using CCTV cameras. When any of these inspections identify pipes in poor condition and requiring remediation, follow-on maintenance, repairs, or renewals are programmed to restore the integrity of the asset and prevent future blockages.

Continuous lining

Assets in remote bushland can be difficult to respond to due to the lack of readily available access. Small-diameter gravity sewers (150–300mm) that are susceptible to tree root intrusion are particularly vulnerable in these heavily treed areas and they are often near waterways as they follow the gravity fall gradient. Due to their remote nature, these sewers have a higher propensity to result in prolonged overflows and therefore more significant impacts to the environment. They are also difficult to safely access for workers and equipment.

In 2020–21, a continuous lining pilot project was completed in the Forestville SCAMP, consisting of relining 1.6 km of sewers in Garigal National Park. This pilot confirmed the practicality of continuous lining as a method to 'rebuild' sewers by continuous relining of the pipes, including lining through maintenance holes. Root removal was completed prior to installing liners. Where continuous lining was not practical (e.g., large level difference between maintenance hole inlets and outlets and tight bends), the maintenance holes were rehabilitated to provide a similar level of integrity, by identifying and repairing faults. Internet of Things (IoT) devices were also installed in maintenance holes where continuous lining was not practical.

Continuous lining is a long-term resilience activity as it lines mainly vitrified clay pipelines with a continuous liner. The liner has a service life of at least 50 years and should be resilient to blockages. It is an expensive option for reducing the risk of overflows in bushland, so each SCAMP where this is applied will be reviewed for effectiveness and continuation of this approach. It may be further refined based on risk, such as areas with high ecosystem value, like national parks.

Construction works for three of the nine continuous lining projects have commenced. Construction works for the Bangor SCAMP commenced in October 2023 and were completed in September 2024. Construction works for the Menai and Engadine SCAMPs commenced in October 2024 and are expected to finish in June and October 2026, respectively. Planning works for the remaining projects are currently underway.

Internet of Things (IoT)

Internet of Things (IoT) devices are an important and permanent part of dry-weather overflow abatement activities. These are low-cost devices, normally float switches connected to the IoT network that monitor wastewater levels in maintenance structures and alarm when wastewater backs up behind blockages such that the level of wastewater in maintenance holes rises.

So long as the surface level of downstream maintenance structures is below the upstream float switch, they are also monitored. The length of pipe monitored downstream depends on local geography and the depth and grade of downstream sewers.

In many cases, there is enough time after an alarm is initiated for a maintenance crew to attend and clear the blockage before an overflow occurs.

The IoT sites in each SCAMP were chosen where the likelihood of blocking and overflowing to waterways was high. The methodology for selecting maintenance chambers for an IoT device considers spatial data on sewer inverts and sewer gradient so that devices cover several chambers (given wastewater will discharge from the lowest point first). Site selection also targeted Emergency Relief Structures on reticulation sewers. In 2023–24, Sydney Water installed 8,464 devices.

Lost flow analysis at wastewater pumping stations

Sydney Water's telemetry system (IICATS) is used to detect sewer blockages upstream of wastewater pumping stations by identifying abnormally low wet-well inflow rates. In 2023–24, the analysis identified 14 potential chokes upstream of wastewater pumping stations that were investigated by field crews. Of the 14 potential chokes, six were confirmed as blockages. Three of the confirmed blockages had already been reported by members of the public. We also identified a private wastewater pumping station failure and issues with instruments at four Sydney Water wastewater pumping stations.

Customer campaigns

A *Toilet Blockers Anonymous* campaign was launched in May 2024 to remind people to only flush the 3Ps (pee, poo and toilet paper) to avoid costly and environmentally damaging chokes and blockages in our wastewater networks. It features a group of toilet blockers who flush items which don't break down, like dental floss, paper towels, non-flushable wet wipes and other unusual items including teeth and golf balls.

3.7.2 Wet weather overflows

Wastewater overflows under wet weather conditions occur when the hydraulic capacity of our wastewater networks or WRRFs' treatment capacities are exceeded due to excessive inflow and infiltration of stormwater. The primary sources of stormwater in the wastewater system come from incorrectly connected private stormwater and inflow into faulty Sydney Water assets. Saltwater ingress, particularly during large tidal events, also affects assets located within the intertidal zone. Groundwater infiltration is similarly known to affect the wastewater network.

Of the 23 wastewater treatment system models, 17 were fully compliant (100 per cent of gauges meeting the acceptance criteria) and six were partially compliant (75 per cent or more gauges achieving the acceptance criteria) in 2023–24. The six models (mostly larger systems) that achieved partial compliance were Cronulla, Malabar, North Head, St Marys, Winmalee and Wollongong. An Independent Criteria Review Committee recommended transitioning these models to a more detailed breakdown into smaller subsystems to improve accuracy (Independent Criteria Review Committee report on Sewerage Trunk System Licence Models, Urban Water Solutions, 2022). Eight models from eight systems were recalibrated in 2023–24 and 15 systems did not require calibration.

Table 3-3: List of wet weather overflow non-compliances by EPL clause (2023–24)

Wastewater system EPL Clause	Non-compliant systems
L7.1 Ongoing use and development of a high-quality Hydraulic System Sewer model	Nil
L7.2 Wet weather overflow limits	Winmalee, North Richmond, Riverstone, Castle Hill, Rouse Hill, Bombo, Shellharbour, St Marys, West Camden, Wollongong
O4.8 (c) Comparison of modelled wet weather overflows	Malabar
O4.9 Exceedance of design capacity of primary disinfection processes	Castle Hill
O4.10 Wet weather partial treatment discharges	Fairfield (Malabar)

Ten systems complied with key EPL conditions (L7.2, O4.8I, O4.9 and O4.10). The compliant systems were Hornsby Heights, Quakers Hill, Richmond, Wallacia, Warriewood, West Hornsby, Cronulla, Bondi, North Head and Penrith. Two systems (Picton and Brooklyn-Dangar Island systems) don't have conditions and were not assessed for EPL compliance conditions.

Ten systems exceeded the L7.2 limits (maximum number of overflows per 10 years, Table 3-3) for wet weather overflows from the reticulation systems.

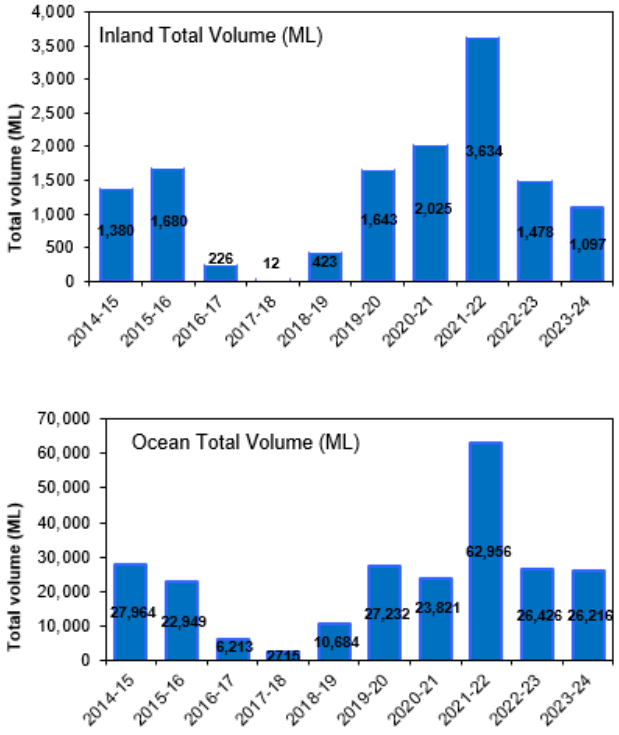
The predicted wet weather overflow frequency for the Malabar system in 2023–24 was 294 overflow events in 10 years, exceeding the benchmark of 238 overflow events in 10 years (EPL condition O4.8c).

The partial treatment capacity of the Fairfield stormwater plant in the Malabar system exceeded benchmark limits for allowable discharges (maximum of 50 overflows in 10 years, Condition O4.9). There were 85 overflows from this stormwater plant in the last 10 years (up to 2023–24).

The non-compliances have been investigated and actions are being taken to identify and deliver works to bring the systems back into compliance.

The modelled overflow volume from 14 inland wastewater systems was 1,097 ML in 2023–24 (Figure 3-10). Modelled wet weather overflows from eight ocean wastewater treatment systems were 26,216 ML in 2023–24 (Figure 3-11). Further details are provided in the report Sydney Water 2023b.

Figure 3-11 Previous 10 years of modelled wet weather overflow volumes from all inland and ocean wastewater systems



Wet Weather Overflows Abatement program (WWOA)

Source control is applied across several programs (primarily WWOA and some from the Growth program) as the main abatement method of wet weather overflows, with amplification and containment as secondary options. Source Control consists of:

- Stage 1: Inflow management – This involves rectifying faulty emergency relief structures (ERSs) by installing backflow prevention valves. These valves stop stormwater from flowing into the wastewater system through the overflow discharge pipe.
- Stage 2: Infiltration management – This stage focuses on reducing infiltration through damaged pipes and maintenance holes. It targets assets located in high-infiltration areas. Rectification works include pipe lining, maintenance hole repairs and installation of anti-infiltration devices ("rain stoppers") in maintenance holes at risk of stormwater ponding, overland stormwater flow or flooding.
- Stage 3: Private properties – This stage focuses on smoke testing and property inspection programs to identify incorrect property stormwater connections and rectifying defective assets. Rectification works include repairing faulty overflow relief gullies and redirecting roof drainage connections from wastewater systems to stormwater systems.

3.8 Stormwater network discharges

Stormwater assets protect people and property from flooding and form part of our urban waterways. Although, our stormwater network is small (456 km), it is a critical part of the metropolitan drainage system, draining 15 per cent of Sydney's urban area. Local councils own and maintain most of the city's stormwater assets. Poor quality stormwater is highly detrimental to waterway health and amenity.

In 2023–24 we removed silt and rubbish from over 75 stormwater quality improvement devices, preventing 1,701 m3 of debris (compared to 3,841 m3 in 2022–23) and 2,679 tonnes of sediment (compared to 1,159 tonnes in 2022–23) from entering Sydney's waterways. We also improve waterway health by naturalising stormwater assets when they reach the end of their structural lifespan.

3.8.1 Naturalisation and waterway health

We are progressively converting degraded concrete open channel stormwater assets into semi-naturalised state. This enhances biodiversity and allows creek lines to become assets that local communities can enjoy. Examples of projects include:

- Muddy Creek Naturalisation Project (Rockdale, 1.6 km creek bank) – On-ground works began October 2022. Project completion is forecast for late 2024. Civil construction is expected to finish by September 2024, with landscaping work complete by mid-2025.
- Iron Cove Creek Naturalisation Project (Haberfield, 400-metre creek bank) – The draft scope of services and technical specification document is being developed by Sydney Water.
- Whites Creek Naturalisation Project (Annandale, 300-metre creek bank) – Design work is underway. Delivery of this project is planned after 2025.
- St Lukes Park Naturalisation Project (Canada Bay, 1.4 km creek bank) – Detailed design work is in progress. Delivery of this project is planned after 2025.

Sydney Water is implementing Waterway Health Improvement Projects (WHIPs), including construction of new wetlands and Stormwater Quality Improvement Devices (SQID)/ Water Sensitive Urban Design (WSUD). Examples of projects include:

- Milson Park WHIP – Operational since August 2023. Two SQIDs are operating: bioretention, stormwater pumping station and swales.
- Parkside Drive WHIP – Operational since September 2023. Three SQIDs are operating: bioretention basins and swales.
- Deakin Park, Silverwater – Preliminary design report completed. Delivery planned after 2025.
- Surrey Street Chain of Parks, Guildford – Preliminary design report completed. Delivery planned after 2025.

4.Efficient and sustainable resource reuse

4 Efficient and sustainable resource reuse

Water conservation is essential for meeting customer expectations and supporting the Greater Sydney Water Strategy (GSWS) and our Long-Term Capital and Operational Plan. It ensures our drinking water supply is used efficiently, making it last longer. This may delay the need for investment in new large-scale drinking water supply sources, such as desalination. Water conservation also enhances our resilience to dry conditions and helps manage the affordability of our services.

4.1 Water conservation

Water conservation was identified in the Greater Sydney Water Strategy (GSWS) as a key action to support a thriving, sustainable and resilient Greater Sydney. Water conservation aims to make the most of available water supplies through the efficient use of water, reducing water waste and using non-drinking water instead of drinking water where feasible.

The NSW State Water Strategy and the GSWS highlight the need for greater emphasis on water efficiency and conservation under all weather conditions to prepare for drought and manage the affordability of water services. This involves making the most of existing assets and deferring the need for investment in new supplies. The GSWS calls for focused efforts on water conservation and water efficiency, aiming to save 38 gigalitres[5] (GL) per year of drinking water by 2030 and 49 GL per year by 2040.

In 2023–24, we are tracking at 24 GL towards the GSWS targets. Water conservation activities during 2023–24 contributed 1,514 ML in annual savings, representing an increase compared to 1,473 ML in 2022–23. Leakage-management programs have ensured that Sydney Water manages drinking water supply efficiently, reducing water loss thus reducing the impact on environment. We produced around 40,068 ML of recycled water in 2023–24, resulting in a reduction in drinking water demand of around 13,061 ML. This is similar to production levels in 2022–23, although ongoing project delivery and maintenance led to lower recycled water volumes compared to the longer-term average. This work will ensure continued long-term operations.

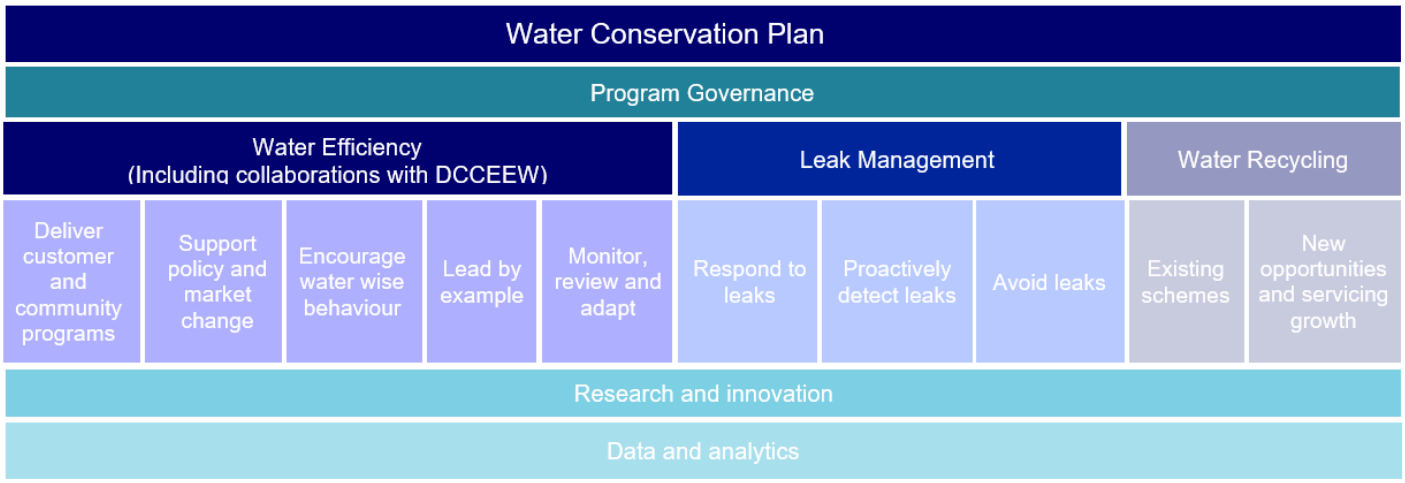
In 2023–24, the total length of mains inspected for leaks under the active leak detection program increased to 16,081 km compared to 13,923 km in 2022–23.

Water Conservation Plan

Sydney Water has developed a comprehensive and adaptive Water Conservation Plan, shaped by what is important to our customers. The plan aims to ensure that “Our water is used more efficiently, and we support the community to save water”. It is delivered through three sub-plans focusing on water efficiency, leak management and water recycling, as illustrated in Figure 4-1.

[5] billion litres of water per year

Figure 4-1 Delivering our water conservation plan



We will monitor our plan and its progress by tracking the total volume of drinking water supplied and average total drinking water use per person. We will also assess the performance and delivery of activities within each of the sub-plans. Refer to Water Conservation Report for further details .

4.2 Electricity demand

Electricity consumption

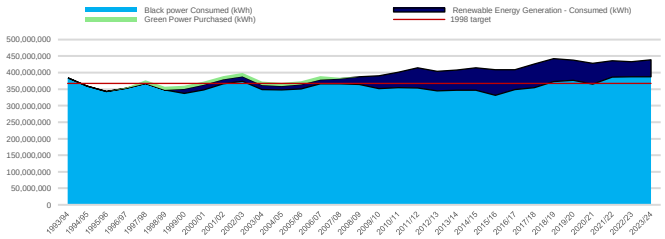
Sydney Water's goal is to achieve grid electricity consumption equal to 1998 levels (366 GWh). In 2023–24, we consumed 388 GWh, exceeding our internal benchmark by 21 GWh.

Grid electricity consumption remained high due to the following factors:

- Residual wet weather impacts following higher-than-average rainfall throughout 2024. Sustained periods of rainfall throughout April and May 2024 in Greater Sydney led to increased electricity consumption for Sydney Water's wastewater system in 2023-24.
- In 2023-24, Sydney Water's self-generated renewable energy increased by 14 per cent compared to 2022–23 but remained below maximum production capacity (~87 per cent expected production). This increase was primarily due to the North Head WRRF hydroelectric power generation plant returning to full capacity during 2023–24 and most cogeneration engines performing well. Minor performance issues were observed at some facilities during short maintenance periods and due to digester performance. The Prospect Hydro power generation plant did not operate again in 2023–24 due to interface issues between the Warragamba Pipeline and the Prospect Water Filtration Plant (WFP). Actions are ongoing to manage risks and return the asset to operation. Additionally, commissioning new cogeneration units at St Marys WRRF and Malabar WRRF is expected to improve renewable energy generation during 2024–25.
- The Sydney Desalination Plant (SDP) remained operational for the duration of 2023–24. While this does not contribute to Sydney Water's grid electricity consumption, the continuous operation of the SDP reflects operational constraints within the water system and contributes to Scope 3 emissions.

Figure 4-2 below shows Sydney Water's energy use, either by 'black' power (i.e. energy from the grid), 'green' power purchased (i.e. low emissions energy purchased from a retailer), and renewable energy produced and consumed onsite.

Figure 4-2 Energy usage by source



Fuel consumption

Sydney Water's fuel usage in 2023–24 increased slightly (8 per cent) compared to 2022–23. This increase is attributed to ongoing major projects and capital works, including planned asset renewals and addressing continued growth in operations aligned with Sydney Water's Long Term Capital and Operational Plan (LTCOP). In 2024–25, Sydney Water expects an ongoing increase in fuel consumption as these plans progress. In 2023–24, Sydney Water contractors began adopting alternative fuel and energy sources, such as purchasing green electricity (approx. 30% of electricity usage from contractors) and biofuel. While the total volume of consumption may rise, Sydney Water

expects greenhouse gas emissions associated with fuel consumption to remain consistent and gradually decline.

Gas consumption

Gas consumption decreased in 2023–24 at multiple Sydney Water sites, including Potts Hill Depot, West Hornsby WRRF and Homebush offices, which had high consumption in 2022–23. Reasons for variable consumption differ across sites. Gas consumption at these sites is expected to remain consistent moving forward.

4.3 Bioresources

While providing water, wastewater, recycled water and stormwater services to our customers, we inevitably generate a range of byproducts, some of which have beneficial value. While some products, such as wipes and other wastewater litter, are unlikely to have value, others do, with adequate treatment, sorting or processing. These 'bioresources' are collected at various stages of the process – during transport and treatment of water, wastewater or stormwater.

Sydney Water's biosolids are an excellent example of how the end product of our wastewater treatment can be recovered and reused as a valuable resource in the agricultural and forestry industries or reprocessed to produce compost. Biosolids are the nutrient-rich organic material produced from wastewater treated at our WRRFs.

We have consistently achieved 100 per cent beneficial reuse of biosolids for agricultural, forestry and horticultural purposes. In 2023–24, Sydney Water beneficially reused 39,825 dry tonnes of biosolids, with 52 per cent sent directly to agricultural land, 17 per cent reprocessed through compost markets, 31 per cent used in forestry and 0.1 per cent applied for other purposes (e.g., at Veolia's Earthpower facility in Camelia to seed a digester, Figure 4-3).

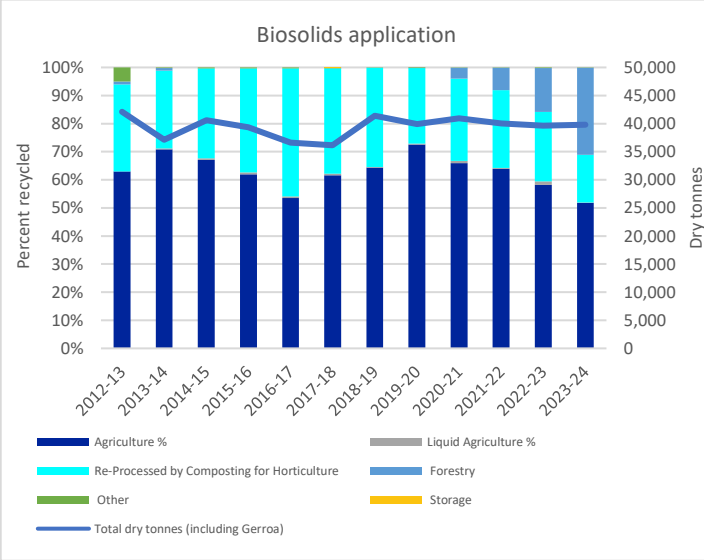
Changes to WRRF operations and the introduction of new technology can impact the quality of biosolids. Sydney Water is also investigating the carbon impacts and benefits of these products across different markets. In 2023–24, we commenced a review of our Biosolids Product Plan, which aims to identify how biosolids will be managed over the next 20 years. This review is expected to be completed by the end of 2024–25.

The management of biosolids faces challenges due to the NSW EPA's review of regulations, which, for the first time, includes controls of specific contaminants of emerging concern. The Biosolids Product Plan is being developed alongside this uncertain regulatory environment using dynamic adaptive planning methods that allow the plan to adjust as conditions changes. The plain is expected to be finalised by the end of 2024–25.

Table 4-1: Bioresources reused

Cause	Description
Wastewater	Biosolids
Water	Water treatment sludges
Land Management	Vegetation (pruning, clearing, riparian zones) Construction spoil Drilling mud

Figure 4-3 Biosolids produced and percentage usage



4.4 Waste

In 2023–24, Sydney Water generated 233,152 tonnes of solid waste, which was lower (33 per cent) compared to 345,748 in 2022–23 (Figure 4-5). Of this, 84 per cent was reused onsite, offsite or sent for recycling (Figure 4-4). The overall recycling rate for 2023–24 was higher than in 2022–23 (79 per cent).

Major projects, such as Prospect to Macarthur, Upper South Creek Pipelines, and Austral Leppington Wastewater Stage 3 are nearing the end of construction phase which has resulted in generating about 103,000 tonnes less waste in 2023–24 compared to 2022–23.

Our construction and demolition activities accounted for 80 per cent (185,810 tonnes) of the total waste generated, making them the largest contributor to waste in 2023–24. Of the waste generated from construction and demolition activities, 89 per cent (164,453 tonnes) was recycled or reused. This rate is attributable to 50 per cent of construction and demolition waste being classified as Virgin Excavated Natural Material (VENM), Excavated Natural Material (ENM) and vegetation (excluding wood). Over 98 per cent of this material was recycled or reused.

Figure 4-4 Waste generated in 2023–24 by categories

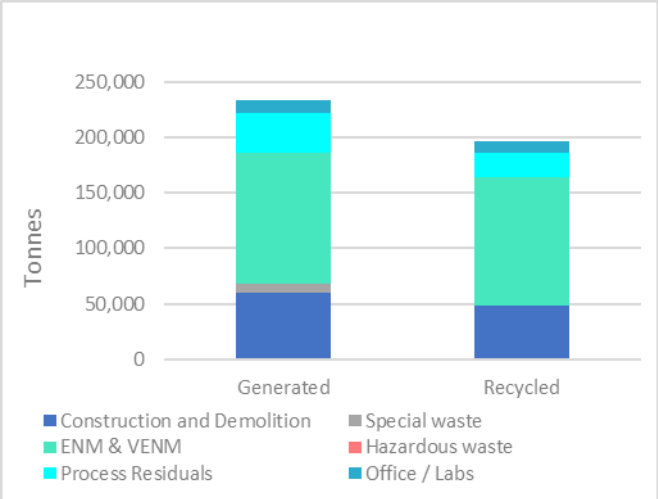


Figure 4-4 shows waste generated in 2023–24 by categories. Special waste (asbestos-contaminated waste) amounted to 8,735 tonnes, whilst hazardous waste amounted to 23 tonnes. The total amount of process waste generated was 36,482 tonnes. The

major contributors were construction and demolition, ENM and VENM waste (ENM and VENM waste is generated from construction and demolition activities).

Figure 4-5 Five-year trends of percentage waste recycled by categories

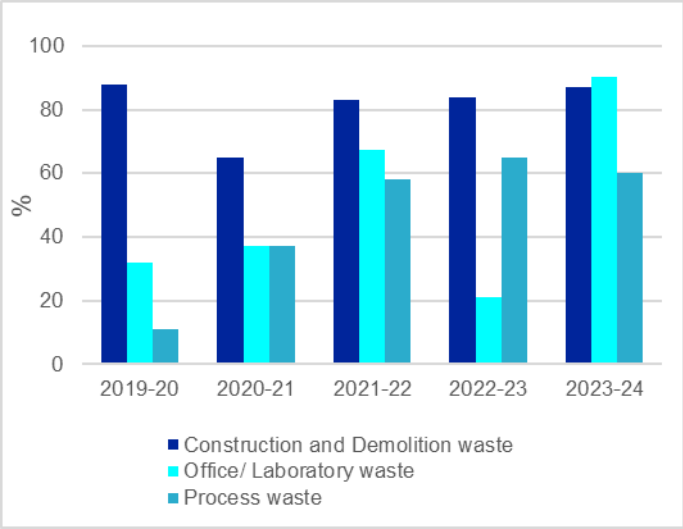


Figure 4-4 shows waste generated in 2023–24 by categories. Special waste (asbestos-contaminated waste) amounted to 8,735 tonnes, whilst hazardous waste amounted to 23 tonnes. The total amount of process waste generated was 36,482 tonnes. The major contributors were construction and demolition, ENM and VENM waste (ENM and VENM waste is generated from construction and demolition activities).

Figure 4-5 shows the trend higher recycling quantities, with 196,164 tonnes recycled in 2023–24**,** an increase compared to previous years. All waste generated by our activities falls into three categories:

- Construction and demolition waste – includes waste generated through our construction and demolition activities.
- Office/laboratory waste – includes waste from office sites and laboratory.
- Process waste – includes waste from wastewater and water treatment processes, incident cleanup and network maintenance activities.

5. Community Involvement

5 Community Involvement

5.1 Community involvement projects

Sydney Water engages with the community by delivering education programs that drive, inspire and support the development of water literacy, laying a strong foundation for a water-sensitive community. These programs aim to encourage water conservation behaviours through formal and informal education and to empower advocacy by including communities in the shared journey of securing our water future.

During 2023–24, our Community Education Discovery Team engaged with over 45,000 children and adults. The Wonders of Water Discovery Van is a mobile education vehicle that helps communities better understand the natural and urban water cycles, explores global water sources and highlights how water is filtered.

5.1.1 Our Water, Our Voice

Our Water, Our Voice program was a six-phase customer engagement program conducted between 2022–24 to provide critical insights into customer preferences and priorities. These insights informed Sydney Water's price proposal to the Independent Pricing and Regulatory Tribunal (IPART), including the price proposal, Operating Licence, Customer Contract and the Long-Term Capital and Operational Plan. Starting in July 2022 and completing in August 2024, Sydney Water engaged extensively with to understand their expectations and priorities, as well as their Willingness To Pay (WTP) for varying levels of investment.

This program was the largest customer engagement effort in the Sydney Water's history, involving over 13,000 customers. The program included six phases:

1. **Capturing customer priorities**
2. **Capturing customer service insights**
3. **Customer insights for better business planning**
4. **Service levels and investments for the future**
5. **Customer-recommended price proposal part 1**
6. **Customer-recommended price proposal part 2.**

Customers' top environmental priorities, ranked by priority, included:

Maintaining clean, safe waterways and water recreation areas by reducing pollution (3);

Reducing water loss by minimising leaks and breaks in the water network (5);

Improving natural waterways and habitats to protect the environment (7);

Reducing water loss to the ocean by improving stormwater management, capture and storage (8);

Contributing to a cooler environment and more pleasant green public spaces through trees and vegetation (11);

Reducing net carbon emissions to zero by 2050 or sooner via more energy-efficient operations and renewable energy (13).

These customer priorities were grouped under the theme of Environmental Protection which informs the Strategic Investment Plan, outlining what Sydney Water can realistically deliver in this area.

5.1.2 Community events

In 2023–24, Sydney Water participated in several major community events, including cricket activations through Cricket NSW sponsorship, the Wiggles Darling Harbour International Convention Centre, Yabun Festival, Pets Day Out in Earlwood, Ramadan Nights at Lakemba, the Royal Easter Show and Bankstown Bites. At these events, Sydney Water engaged with the community on water literacy topics such as wastewater, water conservation and 'Trust in Tap'. Portable water units were a highlight, with extensive bookings throughout the financial year, further reinforcing 'Trust in Tap'.

5.1.3 Water efficiency campaigns

The Future Of Our Water Depends On All Of Us – Jess Fox

In 2023, Sydney Water launched *The Future Of Our Water Depends On All of Us* campaign, an inspiring initiative designed to highlight the shared responsibility of safeguarding Sydney's water as a vital resource. Featuring Olympic gold medallist and water advocate Jess Fox, the campaign used her platform and passion for water stewardship to connect with audiences across Sydney. Jess's personal story and connection to water, both as an athlete and environmentalist, served as a powerful reminder of the importance of protecting water for future generations.

The highly successful digital-only campaign achieved over 20,000,000 total impressions and drove 50,000 visits to Sydney Water's landing pages. The campaign resonated strongly with the CALD (Culturally and Linguistically Diverse) audiences, garnering a total of 790,000 views within this segment.

Stop Being A Water Waster

Sydney Water's *Stop Being A Water Waster* campaign was a dynamic marketing initiative designed to inspire individuals and communities to adopt water-wise habits. With a focus on conserving Sydney's precious water resources, the campaign emphasised small, everyday changes people could make to reduce water waste, such as turning off taps while brushing teeth, using a trigger nozzle in the garden, fixing leaks promptly, and using water-efficient appliances. By highlighting the environmental and financial benefits of saving water, the campaign aimed to empower Sydneysiders to act and contribute to a sustainable future.

The campaign employed a combination of creative storytelling, interactive tools, and public education to make water conservation accessible and appealing. Engaging advertisements, social media challenges, and practical tips motivated people to rethink their water usage at home and in their daily lives. With its blend of humour, education, and practical advice, the campaign fostered a culture of mindfulness about water usage, helping to protect one of Sydney's most vital resources for future generations.

The campaign surpassed previous water conservation efforts, achieving an impressive unique reach of 4,150,000. On average, Sydney Water customers were exposed to the campaign at least 13 times during its run, ensuring widespread awareness and engagement.

National Water Week 2023

As part of National Water Week in October 2023, Parramatta Marist High School participated in an engaging workshop hosted by Sydney Water's ambassador, Shane Jacobson. The 45-minute workshop, attended by over 900 students from Years 7–11 and their teachers, tested their knowledge on various water facts and myths. Students also learned the importance of diversifying our water sources through desalination and purified recycled water (PRW).

5.1.4 Wastewater campaign

Toilet Blockers Anonymous

In May 2024, Sydney Water launched the *Toilet Blockers Anonymous* wastewater campaign to educate the public on the importance of flushing only the 3Ps (pee, poo and toilet paper) to prevent costly and environmentally damaging chokes and blockages. The campaign was featured on TV screens, the airwaves, billboards and social media and focused on a group of toilet blockers who flush items which don't break down like dental floss, paper towels, non-flushable wet wipes and other unusual items including teeth and golf balls.

Sydney Water spends around $27 million a year dealing with up to 20,000 wastewater network blockages caused by people flushing ‘the unflushables’. About 75 per cent of these blockages involve rubbish that should be disposed of in the bin, not the toilet. The campaign’s full impact, including changes in behaviour, is expected to be felt in 2024–25.

5.2 Customer satisfaction, awareness and behaviour

We understand that the work we do impacts our customers and the community in different ways. Effective customer, community and stakeholder engagement enables us to explain proposals and build water literacy, while also providing us the opportunity to share knowledge, issues and support programs. It further allows us to understand and respond to the views of customers, communities and stakeholders. Below are two tools used to monitor customer perceptions of how Sydney Water’s environmental performance.

5.2.1 Brand Tracker

Sydney Water’s Brand Tracker remains a valuable measuring tool for tracking community sentiment over time. Launched in July 2020, it measures the key metrics of Enterprise Advocacy, Trust, Customer Satisfaction, Awareness, Reputation, Price Perception and Customer Promises on an ongoing basis. As an online tracker, it surveys over 13,000 people per year across different customer categories, including residential customers and non-residential groups such as businesses, developers and value makers, such as plumbers and water servicing co-ordinators.

Customer Promises related to the environment, as measured in the Brand Tracker, are summarised in Table 5-1. Quarterly data for 2023–24 shows performance largely stable compared to previous years.

Table 5-1 Brand Tracker Customer Promises related to environment long-term and 2024 overview

Customer trusts Sydney Water to	Yearly				Response FY 2023–24				Trend
	2020–21	2021–22	2022–23	2023–24	Q1	Q2	Q3	Q4	
make it easy to be smart with their water usage • Waterwise	51%	53%	50%	51%	50%	53%	51%	51%	Stable
make it easy to look after the environment • Waterwise	46%	49%	46%	47%	46%	48%	47%	46%	Stable
always protect the environment. • Environmentally focused	59%	61%	57%	59%	59%	59%	59%	59%	Stable
be an environmentally sustainable organisation • Sustainability	55%	58%	54%	56%	55%	56%	55%	56%	Stable
support a sustainable supply of water • Sustainability	62%	65%	62%	64%	63%	64%	64%	64%	Stable

5.2.2 Community Sentiment Monitor

The Community Sentiment Monitor is a long-running ongoing survey that provides insights into community issues that concern customers, while also highlighting what is working well and identifying challenges and opportunities. It surveys over 4,000 residential customers annually.

In the last quarter of the FY2023–24, Sydney Water’s Community Sentiment Monitor revealed that 82 per cent of the 1,078 people surveyed in the quarter agreed they were willing to change their behaviour to save water. Among them, 68 per cent believed they

could take shorter showers, 55 per cent believed they could turn off the tap when brushing teeth and 50 per cent believed they could use a half flush on the toilet when appropriate. Additionally, more respondents acknowledged the possibility of reducing water usage by checking and fixing leaking taps (44 per cent) or waiting for a full load in the dishwasher (40 per cent).

A key challenge for Sydney Water remains the fact that over 54 per cent of customers surveyed in Qtr 4, FY 2023–24 believe that it is acceptable to flush items other than human waste and toilet paper down the toilet (Table 5-2). Items include tissues, hair, leftover milk and tampons. As stated earlier, the 'Toilet Blockers Anonymous' wastewater campaign, launched in May 2024, aims to remind people to only flush the 3Ps (pee, poo and toilet paper) to avoid costly and environmentally damaging chokes and blockages. The full impact of this campaign, along with the behavioural changes, is expected to be seen in 2024–25.

Table 5-2 Community Sentiment Monitor 2023–2024 overview

Applies to flush down the toilet	Yearly		Response FY 2023–24				Trend
	2022–23	2023–24	Q1	Q2	Q3	Q4	
believe that it is okay to flush (items other than human waste and toilet paper)	54%	56%	55%	57%	59%	54%	Stable

6. References

6 References

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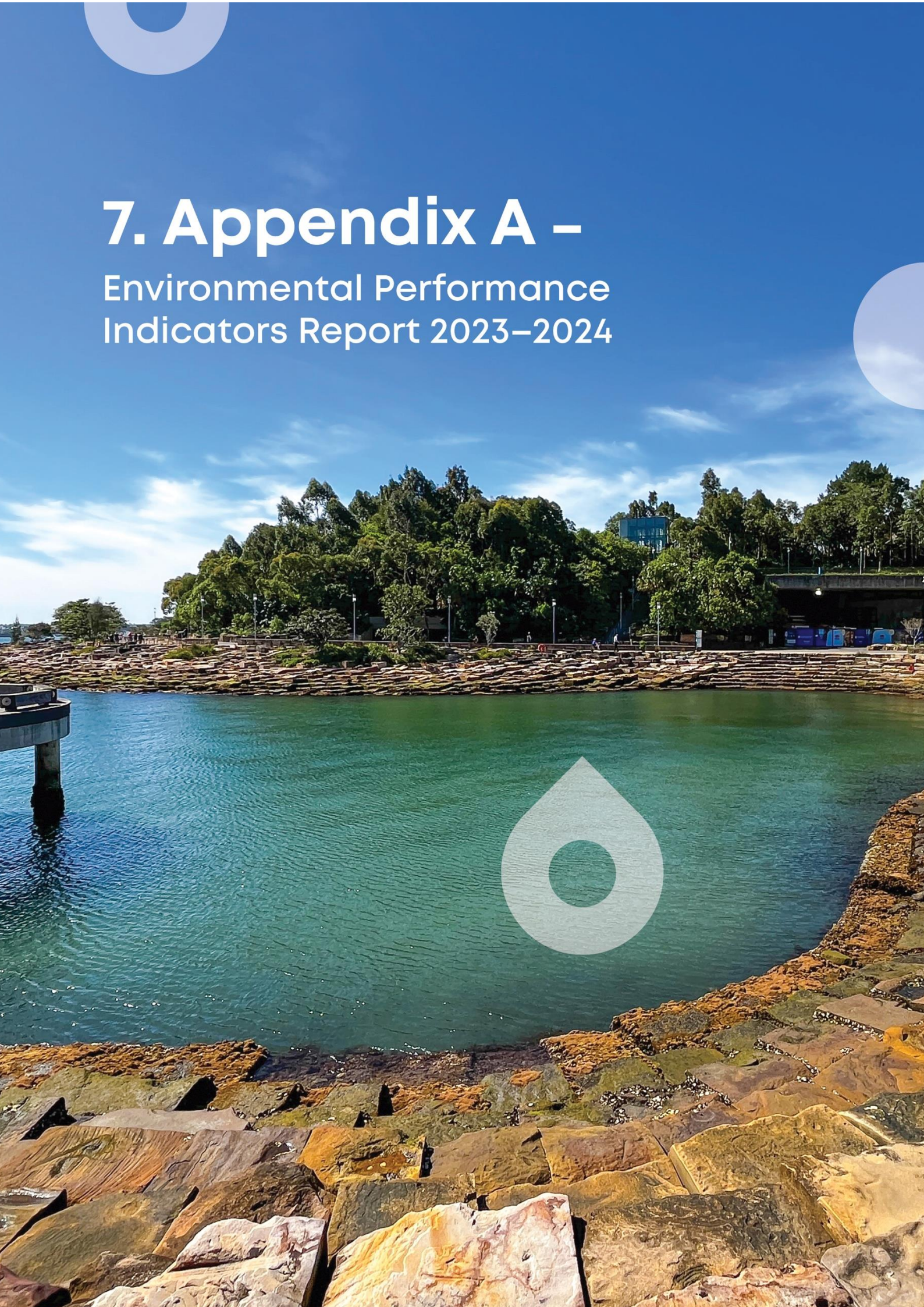
Water Conservation Report 2023-24

7. Appendix A –

Environmental Performance Indicators Report 2023–2024



7 Appendix A – Environmental Performance Indicators Report 2023–2024

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Executive summary

At Sydney Water, caring for and protecting our environment is a core value of everything we do.

Sydney Water is governed by the *Sydney Water Act 1994* (the Act). The Act and our Operating Licence require us to report each year on indicators of the direct impact our activities have on the environment.

The Environment Performance Indicators Report 2023–24 details our performance against the environmental indicators required to be reported to the Independent Pricing and Regulatory Tribunal (IPART) in accordance with clause 8.1.4 of the Operating Licence Reporting Manual (April 2022). These include:

- 10 environmental indicators set by IPART
- 15 National Water Initiative (NWI) indicators relating to the environment, (National urban water utility performance reporting framework: Indicators and definitions handbook, January 2018).

The NWI indicators are part of the National Urban Water Utility Performance Reporting Framework. The NWI is a shared commitment by Australian State and Federal Governments to improve water resource management and use water resources more efficiently. Data from all Australian water utilities is collated annually and published in a National Performance Report prepared by the Bureau of Meteorology (BoM). The report provides a national comparative 'report card' that enables consumers and governments to assess how well water utilities are performing.

Sydney Water's performance against the environmental indicators has been stable for most indicators and improving for some indicators, despite the challenging heavy rainfall during the second half of 2023–24. Key points include:

- A decrease in total wastewater flows received and treated by our Water Resource Recovery Facilities (WRRF) compared to 2022–23, despite the intensity of wet weather flows being high during the second half of the reporting year.
- An increase in uncontrolled and controlled dry weather wastewater overflows. Although our dry weather network overflows increased over 2023–24, the overall choke rate was 21 per cent better than predicted and the second lowest result on record despite soil moisture dropping below average.
- Net greenhouse gas emissions were significantly lower (~11 per cent) compared to 2022–23 mainly due to the grid electricity emission factor for NSW decreasing from 0.73 to 0.68 in 2023–24.
- Electricity consumption was consistent compared to 2022–23 and remains higher than historical usage. This was mainly attributable to residual wet weather impacts following higher-than-average rainfall throughout 2024.
- Sydney Water's goal is to achieve grid electricity consumption equivalent to 1998 levels (367 GWh), 2023–24 consumption did not meet this benchmark by 21 GWh due to increased energy consumption and low renewable energy production.
- Sydney Water's self-generated renewable energy increased by 14 per cent compared to 2022–23 but remained below maximum production capacity. This increase was mainly due to our North Head WRRF hydroelectric power generation plant returning to full capacity during 2023–24 and our cogeneration facilities performing well.
- 100 per cent of biosolids generated from our Water Resource Recovery Facilities were beneficially used.
- Sydney Water generated 233,152 tonnes of waste which was a significant reduction compared to 2022–23. Some major projects such as Prospect to Macarthur, Upper South Creek pipelines, and Austral Leppington Wastewater Stage 3 are nearing the end of construction phase and thus generating less waste.
- The overall recycling rate for 2023–24 was 84 per cent, an increase from 79 per cent in 2022–23. A significant proportion (~50 per cent) of the waste generated was virgin excavated natural material (VENM), excavated natural material (ENM) and Vegetation (excluding wood). Over 98 per cent of this material was recycled or reused.
- In 2023–24, there was a net loss of native vegetation, with a total of 6.15 hectares of native vegetation cleared and 3.62 hectares revegetated or rehabilitated.
- The total area of land owned by Sydney Water that had natural area restoration work conducted in 2023–24 significantly increased to 127.6 hectares, compared to 37.02 hectares in 2022–23.

Sydney Water will continue to improve its environmental performance and resilience, so that we can create a better life with world-class water services.

1. Our environment indicators

Table 3: List of the environment indicators

Category	Indicator
Wastewater treatment and system discharges	**NWI IE1** Volume of wastewater treated to a primary level (ML) **NWI E1** Percentage of wastewater treated to a primary level (%) **NWI IE2** Volume of wastewater treated to a secondary level (ML) **NWI E2** Percentage of wastewater treated to a secondary level (%) **NWI IE3** Volume of wastewater treated to a tertiary level (ML) **NWI E3** Percentage of wastewater treated to a tertiary or advanced level (%) **IPART E3** Total number of controlled wastewater overflows that occur in dry weather that are discharged to the environment, per km of sewer main **IPART E4** Total number of uncontrolled wastewater overflows that occur in dry weather that are discharged to the environment, per km of sewer main
Greenhouse gas emissions	**NWI IE9** Net greenhouse gas emissions: water supply (tonnes CO2 equivalents) **NWI E9** Net greenhouse gas emissions per 1,000 properties: water supply (tonnes CO_2 equivalents per 1,000 properties) **NWI IE10** Net greenhouse gas emissions: wastewater (tonnes CO_2 equivalents) **NWI E10** Net greenhouse gas emissions per 1,000 properties: wastewater (tonnes CO_2 equivalents per 1,000 properties) **NWI IE11** Net greenhouse gas emissions: other (tonnes CO2 equivalents) **NWI E11** Net greenhouse gas emissions per 1,000 properties: other (tonnes CO2 equivalents per 1,000 properties) **NWI IE12** Total net greenhouse gas emissions (tonnes CO_2 equivalents) **NWI E12** Total net greenhouse gas emissions per 1,000 properties (tonnes CO_2 equivalents per 1,000 properties)
Energy	**IPART E1** Total energy consumption by the water utility (electricity, fuel and gas) in units provided on energy bills **IPART E2** Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of electricity consumption
Biosolids	**IPART E5** Estimated total mass of biosolids produced by the water utility **NWI E8** Percentage of biosolids reused (%)
Waste	**IPART E6** Percentage of solid waste recycled or reused expressed as a percentage of solid waste generated **IPART E7** Estimated total mass of solid waste generated by the water utility
Native Vegetation	**IPART E8** Total area of clearing of native vegetation **IPART E9** Total area of native vegetation rehabilitated, including due to replanting, weeding and protection by the water utility **IPART E10** Total area of native vegetation gain due to rehabilitation, replanting, weeding and protection by the water utility

2. Wastewater treatment and system discharges

Indicator	2019–20	2020-21	2021–22	2022-23	2023–24
NWI IE1 Volume of wastewater treated to a primary level (ML)	338,884	343,986	388,757	360,888	348,477
NWI E1 Percentage of wastewater treated to a primary level	67%	63%	62%	64%	63%
NWI IE2 Volume of wastewater treated to a secondary level (ML)	42,255	60,173	76,803	65,242	64,775
NWI E2 Percentage of wastewater treated to a secondary level	8%	11%	12%	12%	12%
NWI IE3 Volume of wastewater treated to a tertiary level (ML)	121,266	137,845	163,063	141,430	136,523
NWI E3 Percentage of wastewater treated to a tertiary or advanced level	24%	25%	26%	25%	25%
IPART E3 - Total number of controlled wastewater overflows that occur in dry weather that discharged to the environment, per km of sewer main[6]	0.0015	0.0013	0.0014	0.0004	0.0012
IPART E4 - Total number of uncontrolled wastewater overflows that occur in dry weather that discharged to the environment, per km of sewer main[7]	0.035	0.031	0.022	0.017	0.028

[6] 2019-20 and 2020-21, the number included overflows reaching waterways only. From 2021-22, the new figures include controlled (IPART E3) wastewater overflows, occurring in dry weather, that have caused potential or actual harm to the environment.

[7] 2019-20 and 2020-21, the number included overflows reaching waterways only. From 2021-22, the new figures include uncontrolled (IPART E4) wastewater overflows, occurring in dry weather, that have caused potential or actual harm to the environment.

Volume of treated wastewater

During 2023–24, treated a total volume of 549,775 ML compared to 567,560 ML during 2022–23 (3.2 per cent decrease). There was a slight decrease in total wastewater flows received and treated, however, intensity of wet weather flows was high during the second half of the year. This has resulted in different levels of treatment provided to the flows at our WRRFs. We are upgrading the capacity of several of our WRRFs to service growth. In addition to servicing growth, we are also upgrading our Inland WRRFs to meet regulatory requirements for improved discharge of total nitrogen and total phosphorus required by the NSW Environment Protection Authority's (EPA's) Hawkesbury Nepean Nutrient Regulatory Framework. This is to reduce pressure on the Hawkesbury Nepean River from urban development in Western Sydney. Various WRRF upgrades are in progress or planned, in combination with increased investment in nutrient offset activities, in line with population growth to manage to the Framework's setpoints.

Number of wastewater overflows/system discharge

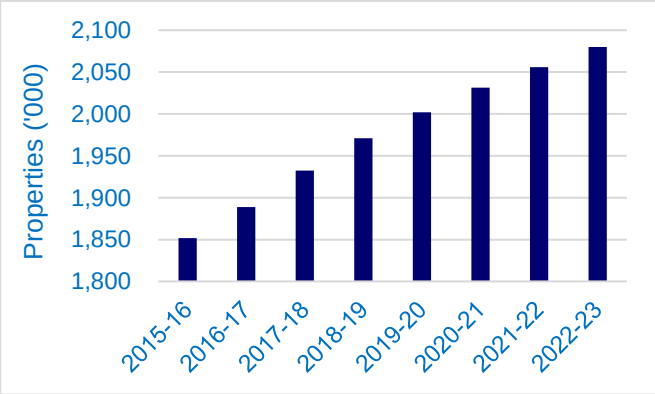
In 2023–24, Sydney Water operated 26,861 km of wastewater main network. There were:

31 controlled dry weather network overflows (from designated - designed overflow structures).

761 uncontrolled dry weather network overflows.

Although drier than previous years, 2023–24 was punctuated by several significant rain events, with the most severe occurring in the second half of the year (Figure 7). In 2023–24, the total number of uncontrolled wastewater overflows during dry weather increased from 466 in 2022–23. The number of controlled overflows also increased, from 12 in 2022–23. Wastewater network performance is strongly correlated with the number of chokes[8] that occur across our network during the year. There is also a very strong relationship between deep soil moisture and the number of chokes that we experience in our wastewater networks. Although our dry weather network overflows increased over 2023–24, the overall choke rate was 21 per cent better than predicted (11,220 actual vs 14,200 predicted) and the second lowest result on record despite soil moisture dropping below average.

Figure 19: Properties with wastewater services available



Dry weather wastewater overflows are generally caused when pipes are blocked by foreign matter (tree roots, fats and grease, non-flushable wet wipes, etc) or when pipes collapse downstream of either a designed overflow structure or other outlet resulting in an uncontrolled discharge to the environment. With more urbanisation and population growth (Figure 19), the pressure on our wastewater network and waterways increases. Sydney Water is focused on minimising the occurrence of chokes in the wastewater system and the risk to the environment from wastewater overflows through a series of preventative programs including:

[8] Chokes are a full or partial blockage in a sewer pipe that results in sewage being discharged to the environment. A choke may be caused by structural collapse of the sewer pipes, tree roots, debris or siltation.

Root Cutting Program - cutting and clearing of roots in wastewater pipes (702 km of wastewater mains cleaned in 2023–24).

Maintenance Hole Inspection Program – inspects maintenance holes and wastewater mains at risk of blockage where overflows could reach waterways to pre-emptively clear any partial blockages. (12,852 maintenance holes inspected in 2023–24).

Closed Circuit Television (CCTV) Inspection Program - inspection of maintenance structures and pipes using CCTV cameras to identify any faults or issues (587 km of sewer pipe inspected in 2023–24).

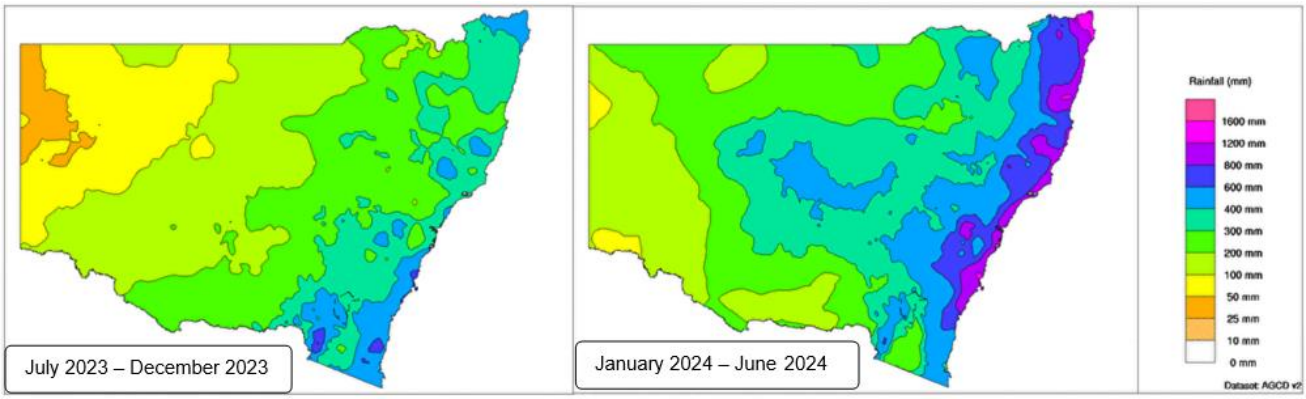
Internet of Things–sensors installed in maintenance holes connected to the IoT network to monitor sewage levels, detect and resolve issues before customers and the environment are impacted (approximately 11,000 sensors installed in 2023–24 bringing the total to approximately 21,000 devices across the wastewater network).

Canine Leak Detection Program – specialised trained dogs locate wastewater leaks in the wastewater network at minute concentrations and where there is often no visible evidence. They help us to detect and repair small leaks before they become major leaks in difficult conditions, such as bushland or challenging terrain (31 investigations in 2023–24).

Toilet Blockers Customer Campaign – television, radio, media and social media advertising campaign focused on changing customers flushing behaviour.

Our environmental performance is reported to the NSW Environment Protection Authority (EPA) every year as required by our Environment Protection Licences (EPLs). To know more about Sydney Water's EPLs issued by the EPA, please see the EPA website and the public register at www.epa.nsw.gov.au

Figure 7: Rainfall maps for reporting period



Source: Bureau of Meteorology

3. Greenhouse gas emissions

Indicator[1]	2019–20	2020–21	2021–22	2022–23[2]	2023–24[7]
NWI IE9 Net greenhouse gas emissions: water supply (tonnes CO_2 equivalents)	119,083	119,145	110,951	105,468	101,937
NWI E9 Net greenhouse gas emissions per 1,000 properties – water supply (tonnes CO_2 equivalents per 1,000 properties)	58	57	54	51	49
Reported NWI IE10 Net greenhouse gas emissions: wastewater (tonnes CO_2 equivalents) [3]	218,569	191,347	226,517	206,088	*193,717*
NWI IE10 Net greenhouse gas emissions: wastewater using updated methodology change (tonnes CO_2 equivalents) [8]	*218,569*	*190,812*	*223,931*	*185,642*	171,263
NWI E10 Net greenhouse gas emissions per 1,000 properties: wastewater (tonnes CO_2 equivalents per 1,000 properties) [8]	109	94	112	100	*94*
NWI E10 Net greenhouse gas emissions per 1,000 properties: wastewater using updated methodology change (tonnes CO_2 equivalents per 1,000 properties) [8]	*109*	*94*	*110*	*91*	83
NWI IE11 Net greenhouse gas emissions: other (tonnes CO_2 equivalents) [4]	20,886	25,278	25,622	27,513	25,598
NWI E11 Net greenhouse gas emissions per 1,000 properties: other (tonnes CO_2 equivalents per 1,000 properties) [5]	10	12	12	13	12
NWI IE12 Total net greenhouse gas emissions (tonnes CO_2 equivalents) [8]	358,537	335,770	363,089	339,069	*321,252*
NWI IE12 Total net greenhouse gas emissions using updated wastewater methodology change (tonnes CO_2 equivalents) [8]	*358,537*	*335,235*	*360,503*	*318,623*	298,798

NWI E12 Total net greenhouse gas emissions per 1,000 properties (tonnes CO_2 equivalents per 1,000 properties) [6, 8]	175	161	175	163	*156*
NWI E12 Total net greenhouse gas emissions per 1,000 properties using updated wastewater methodology change (tonnes CO_2 equivalents per 1,000 properties) [8]	*175*	*161*	*173*	*154*	141

[1] Data excludes the Sydney Desalination Plant. It continues to offset 100 per cent of its electricity consumption with renewable energy. Scope 3 emissions are excluded. Scope 3 emissions are defined in the Greenhouse Gas Protocol, www.ghgprotocol.org. For the purposes of this submission, BOOT plants and Contractor emissions are included as Scope 1 and 2 emissions as appropriate.

[2] Data for NWI E9, E10, E11 and E12 indicators for the previous financial year are updated after the National Greenhouse and Energy Reporting (NGER) audit and submission on 31 October 2023. The total greenhouse gas emissions for FY2022–23 increased by approximately 2,000 tonnes of CO_2e due to revised fugitive emissions totals.

[3] Methodology for calculating fugitive emissions from Bondi Water Resource Recovery Facility changed in 2023–24, affecting the overall measurement of greenhouse gas emissions for wastewater. Figures using old methodology, and back-calculated figures of new methodology have been shown for comparative purposes. See comments in body of submission and Table 3 for further detail on the nature and materiality of this change.

[4] Includes corporate overheads and the surrender of NSW Greenhouse Gas Abatement Certificates (NGACs) to offset greenhouse gas emissions. No NGACs have been surrendered for the past 5 years, however the option is available to Sydney Water and this is where those surrendered certificates would be captured.

[5] Includes recycled water use.

[6] Total net emissions do not equal the sum of NWI E9, NWI E10 and NWI E11 as the numbers of properties with water and wastewater services differ. NWI E10 is calculated using the number of properties supplied with wastewater services. NWI E9, E11 and E12 are calculated using the number of properties supplied with water services.

[7] Data will be finalised after the NGER audit and will be updated in the following year report

[8] Indicator has been affected as per note 3 from follow-on calculations / summing of figures. No material change other than note 3

Sydney Water's operational greenhouse gas emissions

Sydney Water reports its greenhouse gas emissions (that is, the equivalent carbon dioxide (CO_2–e) emissions) by measuring its electricity, fuel and gas consumption and fugitive gas emissions (NWI E9 and E10). Emissions reported in NWI E11 include emissions from corporate overheads and the surrender of carbon offsets.

In 2023–24, Sydney Water's net greenhouse gas emissions were 298,798 tonnes of CO2-e, which is ~5 per cent lower than the equivalent comparative figure in 2022–23. The reported figures for 2022–23 have been shown in the table above for comparison, as a methodology change occurred within the financial year of reporting (as mentioned below). Factors affecting emissions in 2023–24 include:

The grid electricity emission factor for NSW decreased from 0.73 to 0.68 in the 2023–24 reporting period as updated and published by the Clean Energy Regulator due to grid decarbonisation (increased renewable energy) in the network. Consequently, Sydney Water's carbon emissions from grid electricity consumption decreased accordingly.

The amount of self-generated renewable energy produced by Sydney Water increased by 14 per cent compared to 2022–23 but remained below maximum production capacity (~87 per cent expected production). This increase was mainly due to the North Head WRRF hydroelectric power generation plant returning to full capacity during 2023–24 and the majority of the cogeneration engines performing well. Minor performance issues were observed for short periods of time at some facilities due to maintenance and digester performance. The Prospect Water Filtration Plant (WFP) hydroelectric power generation plant again did not operate in 2023–24 due to interface issues between the Warragamba Pipeline and Prospect WFP. Actions are continuing to manage risks so that the asset can return to operation. Additionally, the commissioning of new cogeneration units at St Marys WRRF and Malabar WRRF should increase renewable energy generation during 2024–25.

Sydney Water's estimated carbon emissions from wastewater treatment decreased compared to previous years. Due to the high variability in emissions between years, a review was undertaken of the sampling frequency and the Water Service of Australia Association (WSAA) models used, as per the NGERs methodology requirements, to calculate these emissions. Improvement opportunities were identified and implemented such as increasing the sampling frequency which improved the accuracy of the results and model adjustments targeting Bondi WRRF. Consequently, the overall fugitive / Scope 1 emissions

have reduced compared to previous years. To be transparent with the large reduction in emissions from 2022–23, it is important to show the relativity of the improved methodology to previous years, which can be seen in Table 3 detailed breakdown of GHG activities can be found in Figure 21, Figure 22 and Table 4.

Figure 21: Greenhouse gas emissions per 1000 properties

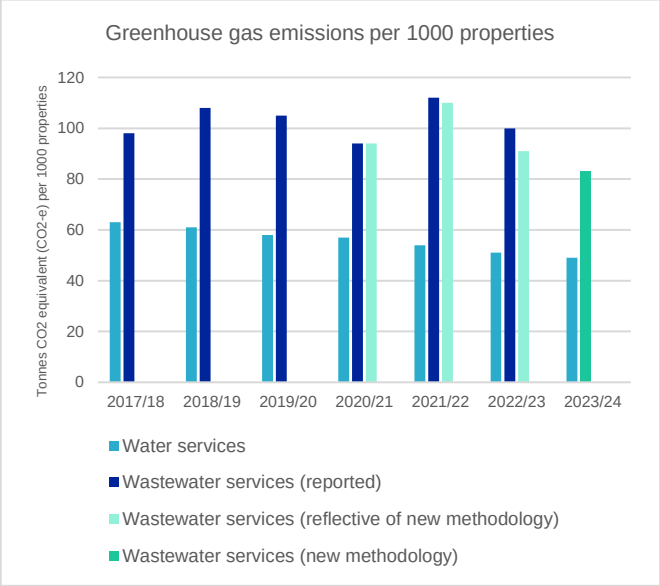


Figure 21 includes total Scope 1 and Scope 2 emissions (i.e. purchased electricity, fuel combustion and fugitive emissions). Carbon offsets from the surrender of NGACs are not included. Data excludes the Sydney Desalination Plant (SDP) and build-own-operate-transfer (BOOT) contractors. SDP continues to offset 100 per cent of its electricity consumption with renewable energy. Results use emission factors published by the Commonwealth Department of the Environment in the National Greenhouse Accounts (NGA) Factors. Sydney Water applies the Scope 1 and Scope 2 emissions factors used for National Greenhouse and Energy Reporting.

A comparison of greenhouse gas emissions per 1,000 properties for water and wastewater services is shown in Figure 21. Greenhouse gas emissions for water supply (NWI E9) in 2023–24 was marginally lower than the previous year. This can be attributed to an increase in water supply from the desalination plant (which offsets 100 per cent of its electricity consumption with renewable energy).

Greenhouse gas emissions for wastewater collection and treatment (NWI E10) decreased compared to 2022–23 and continues to trend downwards over the past 3 years.

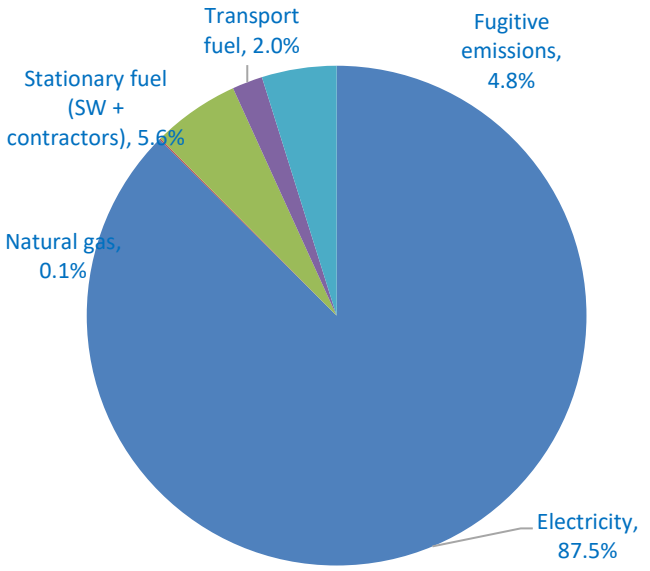
To know more about National Greenhouse and Energy Reporting (NGER), please see the Australian Government's Clean Energy Regulator website at www.cleanenergyregulator.gov.au. A

Table 4: Sydney Water's greenhouse gas emissions by fuel type in 2023–24

Source	Tonnes CO_2 equivalent in 2023–24	% of total	Variance compared to 2022–23
Electricity	263,762	88.2	↓ (-6.8%)
Natural gas	251	0.1	↓ (-17.7%)
Stationary fuel	14,505[1]	4.9	↑ (8.5%)
Transport fuel	5,938	2.0	↔ (1.1%)
Fugitive emissions	14,563	4.9	↑(7.7%)[2]
Sub-total tonnes CO_2–e (gross)	299,019	100	↓ (-11.1%)
Surrender of carbon credits	-	-	-
Contractor emissions	226 [1]		↓ (-12.5%)
Total tonnes CO_2-e (net)	299,245		↓ (-11.1%)

[1] This value includes all of contractors' electricity consumption. Contractors' fuel consumption is included in Stationary fuel.
[2] Variance is compared to the revised value for 2022–23. Fugitive emissions calculation methodology changed in 2023–24 as per Table 1. Variance to the reported value using the old methodology was 57.6 per cent lower.

Figure 22: Greenhouse gas emissions by fuel type



Sydney Water measures fugitive emissions from wastewater treatment operations by using a model of each treatment plant, and mass balancing emissions across the treatment process. The table below shows the results of these calculations as they would have been applied in each of the past six years and demonstrates why 'Method 3' is the most accurate for estimating fugitive emissions in the treatment process at Bondi WRRF. As such, the reduction in fugitive emissions observed in 2023–24 is a result of improved understanding of sampling and modelling at this plant, and not a result of improved processes or carbon capture.

Table 3: Historical calculation of fugitive emissions, specifying key sampling points for inputs to mass balance modelling.

Indicator	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
Measured methane consumed / managed at Bondi WRRF (tonnes CO2-e)	61,744	59,124	54,339	43,952	48,032	48,860
Estimated methane produced in Digestion process by 'Method 1'[1]	16,889	*535*	*583*	*2,585*	*21,752*	*25,401*
Estimated methane produced in anaerobic digestion by 'Method 2'[2]	*N/A*	58,674	62,583	53,471	68,478	*71,314*
Estimated methane produced in anaerobic digestion by 'Method 3'[3]	*N/A*	*58,139*	*62,000*	*50,885*	*46,725*	45,913
Difference between estimated methane production and measured methane production (tonnes CO2-e)	-44,855	-935	8,244	9,519	20,446	-2,947
Reported fugitive emissions attributed to activities at Bondi WRRF (tonnes CO2-e)[4]	0	0	8,244	9,519	20,446	0
Reported fugitive emissions by Sydney Water at all WRRFs (tonnes CO2-e)	48,596	31,410	21,136	38,602	34,348	14,563
Per cent of fugitive emissions attributed to methane emissions at Bondi WRRF	0%	0%	39%	24%	59%	0%

1 In 2018–19 and prior, estimated methane production in the digestion process was calculated by estimating the difference in biological material at the Bondi WRRF influent and Bondi WRRF effluent. The equation for 'Method 1' calculation can be expressed as M = influent - effluent

2 In 2019–20, it was observed that there was negligible difference in biological concentration in the influent and effluent at Bondi WRRF. As such, sampling was expanded to include the biological content of raw sludge entering the digester, and digested sludge leaving the digester, which was then combined to model methane production. The equation for 'Method 2' calculation can be expressed as M = (influent + raw sludge) – (effluent + digested sludge).

3 In 2023–24, it was observed that for the past 3 financial years, emissions at Bondi WRRF had significantly contributed to Sydney Water's overall fugitive emissions footprint and a detailed analysis of the model was undertaken. It was found that the 'Method 2' calculation double-counted the biological material entering the digestion process, by summing both the influent and raw sludge concentrations. Additionally, the variability of samples was found to be unnaturally high, which influenced final calculations. As such, the model was revised to only estimate methane emissions using the concentrations of raw and digested sludge, and sampling frequency of these points was doubled to 24 samples / year. The equation for 'Method 3' calculation can be expressed as M = raw sludge – digested sludge. This methodology is determined to be the most accurate in estimating methane emissions from the digester process, due to increased sampling frequency, lower sample variability, and prudent application of the calculation to the treatment process. This methodology will be carried through in all future emissions calculations at Bondi WRRF.

4 When reporting emissions associated with methane production at all Sydney Water WRRFs, the model assumes that any negative difference in modelled / measured methane production is equal to zero '0' net emissions produced. As such, all negative differences when comparing the measured methane emissions with any of the 3 Methods over the last 6 years were reported as zero '0' net tonnes of CO2-e. Values which are within +/- 10 per cent of the measured methane amount are also reported as 0 net tonnes of CO2-e

4. Energy

Indicator	Unit	2019–20	2020–21	2021–22	2022–23[1]	2023–24
IPART E1 - Total energy consumption by the water utility in units provided on energy bills [2]	Electricity (kWh)	377,262,267	365,364,977	386,380,778	387,835,385	387,884,723
	Fuel (L)[3]	3,127467	4,439,968	4,935,414	5,968,824	6,469,470
	Gas (MJ)	7,026,228	6,364,680	5,235,915	5,927,892	4,876,213
IPART E1 - Total energy consumption by the water utility – electricity -in units provided on energy bills (kWh) – including SDP and BOOT [4]		606,502,995	474,826,264	496,246,171	662,477,584	547,558,631
IPART E2 Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of electricity consumption - excluding SDP and BOOT		15.5%	15.7%	12.2%	11.8%	13.4%
IPART E2 Electricity consumption from renewable sources or generated by the water utility expressed as a total percentage of electricity consumption. - including SDP and BOOT [5]		41.2%	28.5%	25.8%	42.5%	32.8%

[1] 2022–23 data has been updated retrospectively, following a third-party audit review prior to NGERs submission through the Clean Energy Regulator.

[2] Electricity consumption data only includes energy used by assets under Sydney Water's control.

[3] In 2019–20, Sydney Water engaged the Regional Delivery Partners (RDPs, previously RDCs), as a partner to deliver design, construction, maintenance and facilities management. Fuel consumption includes RDPs data in addition to other third-party service providers. In 2023–24, the Contractors' fuel consumption is 4,115,294 litres, which accounts for 59.5 per cent of total fuel consumption at Sydney Water.

[4] E1 reporting from 2019–20 now includes electricity consumption by build-own-operate-transfer (BOOT) contractors and Sydney Desalination Plant (SDP). Previously these sources were not included. The total BOOT, Contractor, and SDP electricity consumption in 2023–24 is: 159,673,908 kWh, which accounts for 29.2 per cent of total electricity consumption at Sydney Water throughout the year.

[5] Total electricity consumption includes SDP and BOOT contractors' data per E1 requirement. For 2023–24, the electricity generated from renewable resources for BOOT contractors is 34.5 per cent and SDP is 100 per cent offset by renewable energy. Sydney Water (excluding SDP and BOOT contractors) self-generated 13.2 per cent of the total electricity consumed.

IPART E1 – energy consumption electricity, fuel, and gas

Electricity consumption:

Electricity consumption at Sydney Water operations in 2023–24 (387,884,723 kWh, excluding SDP and BOOT contractors) was consistent with consumption in 2022–23, and remains higher than prior historical figures. Figure 23 shows a comparison of this year's performance with previous years.

Our goal is to achieve grid electricity consumption equivalent to 1998 levels (367 GWh). In 2023–24, consumption was above the internal benchmark by 21 GWh.

Grid electricity consumption remains high due to:

Residual wet weather impacts following higher-than-average rainfall throughout 2024. Sustained periods of rainfall throughout April and May in Greater Sydney led to increased electricity consumption for Sydney Water's wastewater system.

Sydney Water's self-generated renewable energy increased by 14 per cent compared to 2022–23 but remained below maximum production capacity (~87 per cent expected production). This increase is mainly due to North Head WRRF hydroelectric power generation plant returning to full capacity during 2023–24 and majority of the cogeneration engines performing well. Minor performance issues were observed for short periods of time at some facilities due to maintenance and digester performance. The Prospect Hydro power generation plant again did not operate in 2023–24 due to interface issues between the Warragamba Pipeline and the Prospect WFP. Actions are continuing to manage risks so that the asset can return to operation. Additionally, the commissioning of new cogeneration units at St Marys WRRF and Malabar WRRF should improve renewable energy generation during 2024–25.

The SDP remained operational for the duration of 2023–24. While this does not contribute to Sydney Water's grid electricity consumption, the continuous operation of SDP is indicative of operational constraints throughout the water system.

Fuel consumption:

Sydney Water's fuel usage in 2023–24 increased slightly (8 per cent) compared to consumption in 2022–23. This is due to continuing works with major projects and capital works. These works included planned asset renewals, and commencing works to address continued growth in operations aligning with Sydney Water's Long Term Capital and Operational Plan (LTCOP). In 2024–25, Sydney Water expects to see continued increase in fuel consumption as these plans progress. In 2023–24, Sydney Water contractors have begun to adopt alternative fuel and energy sources, purchasing green electricity and Biofuel. As such, while the metric volume of consumption may rise, Sydney Water expects to see the greenhouse gas emissions associated with this consumption remain consistent and gradually decline.

Gas consumption:

Gas consumption decreased in 2023–24 due to reduced consumption at multiple sites throughout Sydney Water's operations. These sites included Potts Hill Depot, West Hornsby WRRF, and Homebush offices, which had high consumption in 2022–23. The reasons for variable consumption differ between sites. Sydney Water expects gas consumption at these sites to remain consistent.

IPART E2

Total electricity consumption from renewable sources or generated by Sydney Water can be divided into three parts:

Sydney Water operations: Sydney Water's on-site renewable energy generation (58,820,485 kWh) was 13.4 per cent of total energy consumption in 2023–24. Renewable generation increased compared to 2022–23, but still remains below maximum capacity:

Malabar WRRF's two operational cogeneration units performed well during 2023–24 and had higher energy production than historical consumption for 2022–23. The project to replace a third cogen unit will continue throughout 2024–25.

- Prospect Hydro power generation plant remained offline in 2023–24 due to operational constraints. Works are continuing to restore operations in 2024–25.
- North Head WRRF hydroelectric power generation plant returned to maximum renewable energy production following maintenance in early 2023–24.
- Various minor outages of cogeneration units at multiple WRRFs across the year contributed to below-maximum output of renewable energy.

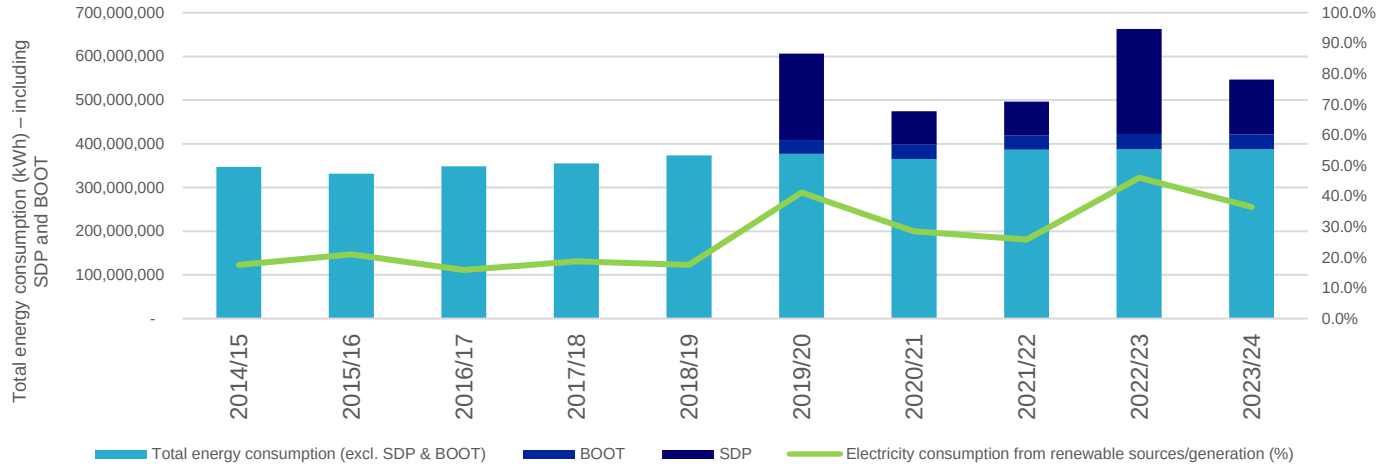
- The commissioning of a new cogeneration unit at St Marys WWRF in late 2024 should see renewable energy increase in 2024–25.

Sydney Water's overall efficiency of renewable energy production saw a 14 per cent improvement on 2022–23, however, remains ~10 per cent below maximum possible production due to the issues identified above.

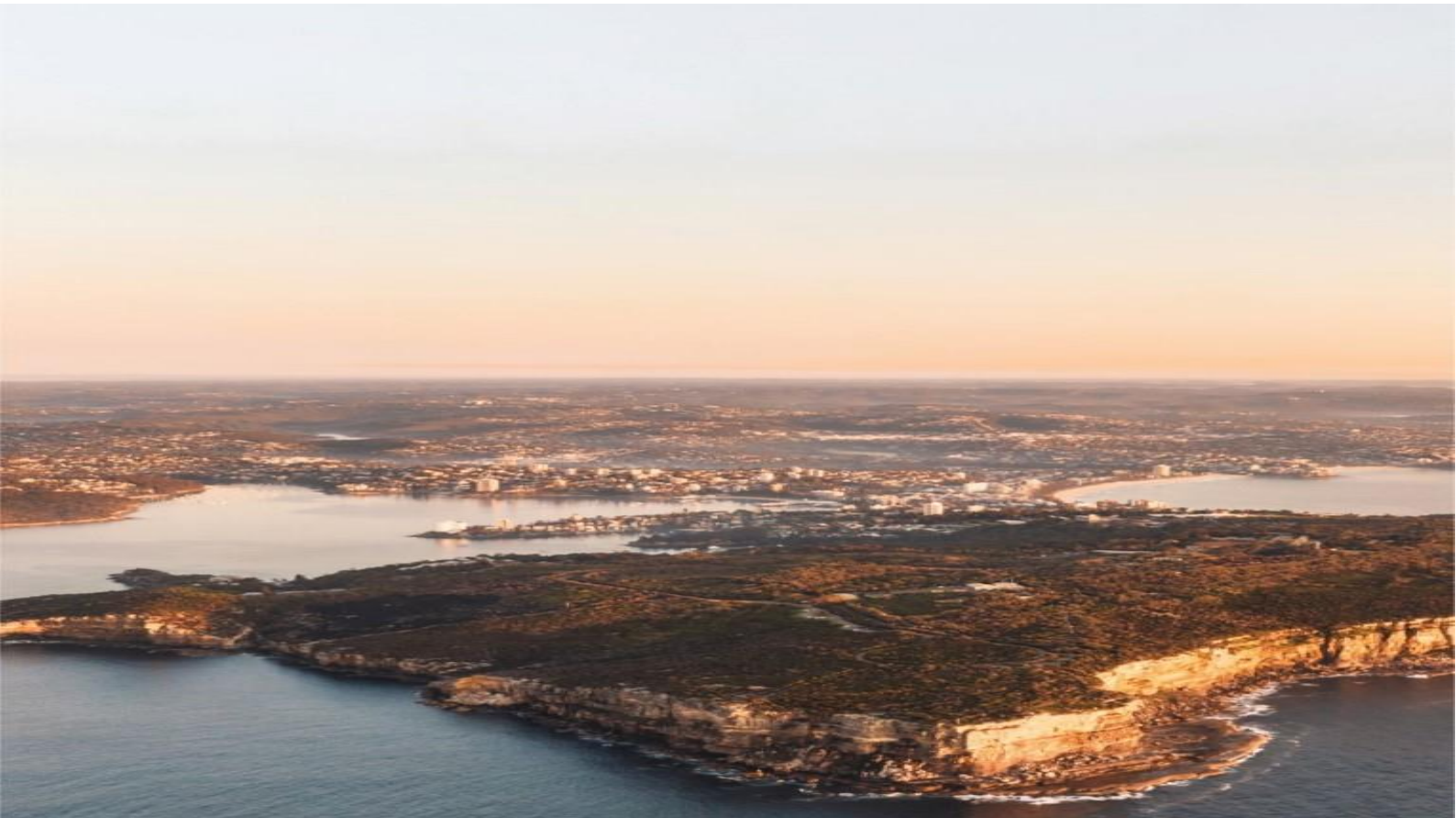
SDP: the electricity consumption at SDP is 100 per cent offset by renewable sources (wind power). SDP remained operational in 2023–24 to minimise the impacts of poor raw water quality events in 2024, however at lower consumption compared to 2022–23.

BOOT contractors: Illawarra Water Filtration Plant continues to operate its onsite hydroelectric power generation plant to provide renewable energy generation. This energy supplied an estimated 100 per cent of Illawarra's onsite demand in 2023–24, with additional energy exported to the grid.

Figure 23: Summary of IPART E1 & E2



Note: From 2019–20, BOOT and SDP data are included in E1 total electricity consumption



5. Biosolids

Indicator	2019–20	2020–21	2021–22	2022–23	2023–24
IPART E5 Estimated total mass of biosolids produced by the water utility (dry tonnes)	39,918	40,924	40,241	39,672	39,825
NWI E8 Percentage of biosolids reused	100%	100%	100%	100%	100%

Biosolids are the nutrient-rich organic material produced when we treat wastewater at our WRRFs. Variations in wastewater treatment processes, population and flows to our WRRFs can all affect annual totals. Totals may also include biosolids produced in the previous reporting period, as we don't record totals until after the biosolids are removed from the WRRFs.

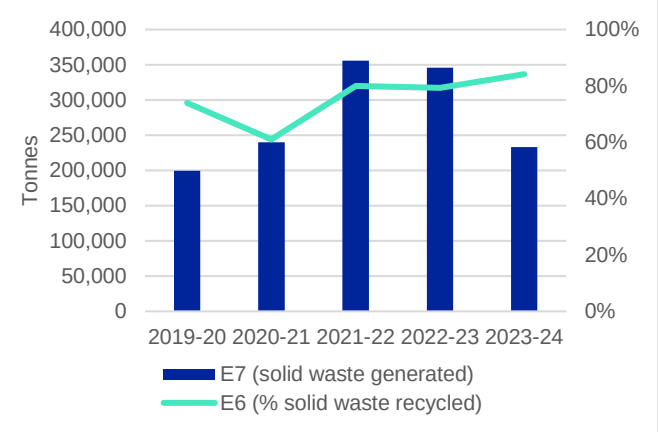
Sydney Water has consistently achieved 100 per cent beneficial reuse of biosolids. Biosolids are used for direct land application in agriculture and forestry or re-processed to produce compost.

To know more about the use of biosolids, click here.

6. Waste

Indicator	2023–24
IPART E6 Percentage of solid waste recycled or reused expressed as a percentage of solid waste generated (%)	84%
IPART E7 Estimated total mass of solid waste generated by the water utility (tonnes)	233,152

Figure 24: Five-year trends for E6 and E7



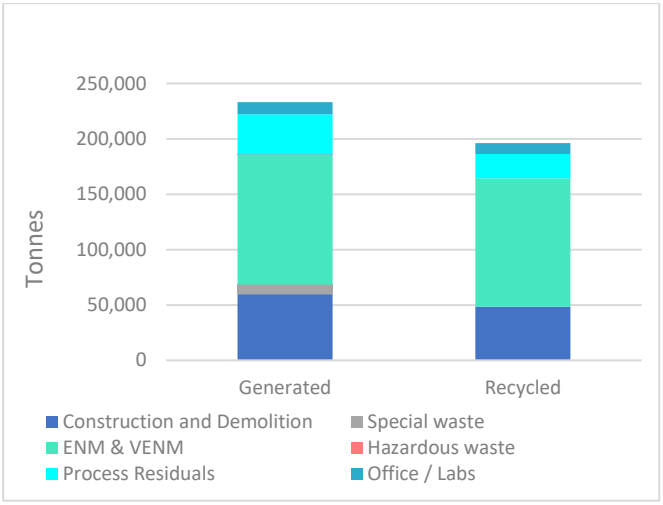
IPART E6 and IPART E7

In 2023–24, Sydney Water generated 233,152 tonnes of solid waste, which was lower (33 per cent) compared to 345,748 in 2022–23 (see Figure 24). Of this waste, 84 per cent was reused onsite, offsite or sent offsite for recycling. The overall recycling rate for 2023–24 was higher than 2022–23 (79 per cent). Some major projects such as Prospect to Macarthur, Upper South Creek pipelines, and Austral Leppington Wastewater Stage 3 are nearing the end of construction phase which has resulted in generating about 103,000 tonnes less waste in 2023–24 compared to 2022–23.

Our construction and demolition activities were responsible for 80 per cent (185,810 tonnes) of the total waste generated and were the major contributor to the overall generation of waste in 2023–24. Of the waste generated from our construction and demolition activities, 89 per cent (164,453 tonnes) was recycled or reused. This is attributable to 50 per cent of construction and demolition waste being virgin excavated natural material (VENM), excavated natural material (ENM) and Vegetation (excluding wood). Over 98 per cent of this material was recycled or reused.

Figure 25 shows waste generated in 2023–24 by categories. Special waste (asbestos-contaminated waste) amounted to 8,735 tonnes, whilst hazardous waste amounted to 23 tonnes. The total amount of process waste generated was 36,482 tonnes. Construction and demolition, ENM and VENM waste were the major contributors.

Figure 25: Waste generated in 2023–24 by categories



Significantly less waste was generated in 2023–24 compared to the previous two years as shown in Figure 26. Though there was some increase in office waste which was attributable to office renovations.

Figure 26: Five-year trends waste generated by categories

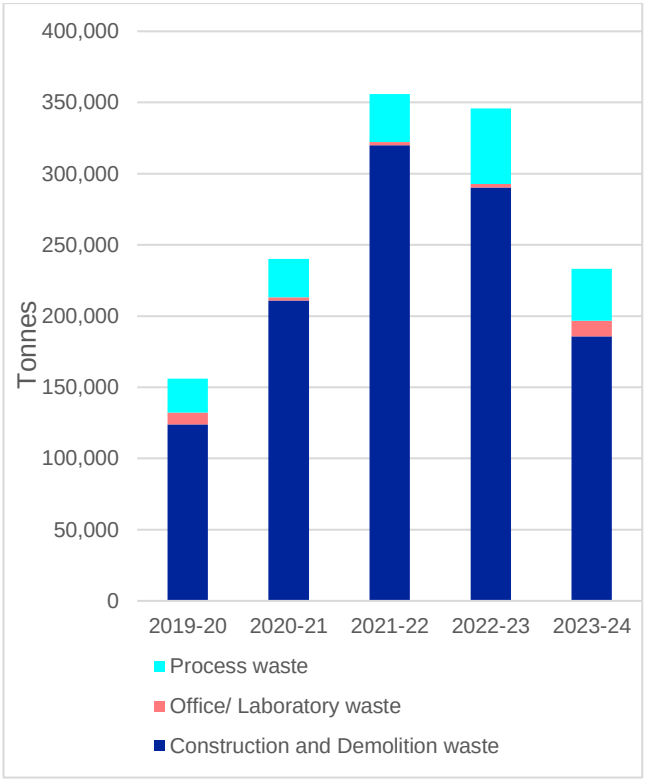


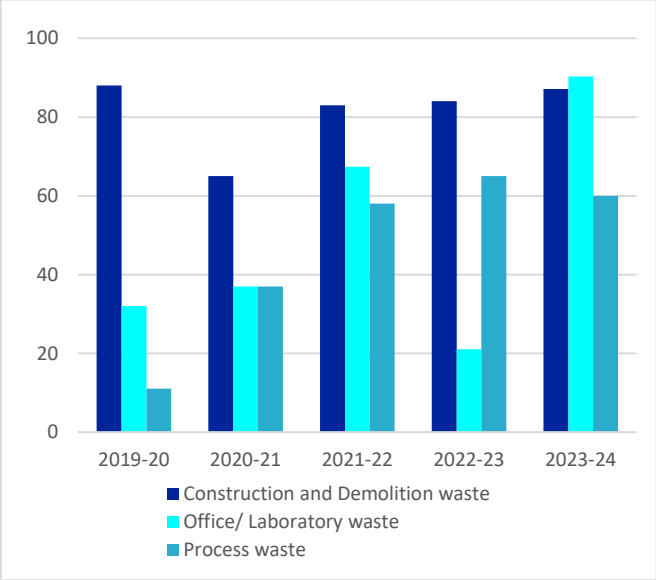
Figure 27 shows that the overall quantities of waste recycled are higher (196,164 tonnes) compared to previous years. All types of waste generated by our activities have been grouped into three categories –

Construction and demolition waste – includes waste generated through our construction and demolition activities.

Office / laboratory waste – includes waste generated at our office sites and also includes laboratory waste.

Process waste – includes waste generated through wastewater and water treatment processes, incident clean up processes as well as regular activities to maintain our networks.

Figure 27: Trends percentage waste recycled by categories



Construction and demolition waste was the major contributor to the overall recycled figure. Office / laboratory recycled quantities were also higher compared to previous years–. Sydney Water is committed to reducing the quantity of waste we generate that gets sent to landfill, as can be seen in the overall consistent and improving trends in recycling rates.

7. Native vegetation

Sydney Water recognises the importance of maintaining and enhancing biodiversity through all stages of the project lifecycle. Biodiversity is vital for supporting liveability, and supplying us with clean air, healthy waterways and vibrant ecosystems. Our cities' unique natural landscapes are increasingly valued by communities for recreation and for the natural habitats they support. We are committed to protect, restore and enhance our natural environment. We will look for opportunities to maintain and enhance biodiversity across our project life cycle. We will avoid, minimise and mitigate the impacts of native vegetation removal before offsetting the residual impacts. The minimum area of native vegetation reported for each project is 0.01 hectares (ha), or 100 square metres. The scale and scope of capital works, the natural and built characteristics of a site, and the timing of reporting influence Sydney Water's performance (refer to Figure **28**, **Error! Reference source not found.**, and Figure 30 for historical performance).

Indicator	2023–24
IPART E8 Total area of clearing of native vegetation (ha)	6.15
IPART E9 Total area of native vegetation rehabilitated, including due to replanting, weeding and protection by Sydney Water (ha) #	131.19
IPART E10 Total area of native vegetation gain due to rehabilitation, replanting, weeding and protection by Sydney Water (ha) ^	-2.53

^ Data reflects either the net gain or loss of native vegetation annually from capital works projects only.

Capital works and major projects

Sydney Water carries out capital works to renew and upgrade its assets, deliver government programs, and support urban growth. Since 2019–20, a cumulative total of 29.4 ha of native vegetation has been cleared and 13.55 ha has been revegetated or rehabilitated through construction project work. Most of the clearing is temporary, with the disturbed land revegetated through site restoration with native species.

In 2023–24, there was a net loss of native vegetation, with a total of 6.15 ha of native vegetation cleared and 3.62 ha revegetated or rehabilitated. Upper South Creek projects cleared the most, removing 3.8 ha to install infrastructure. As capital works projects often take longer than 12 months, there is a lag between reporting data on upfront clearing and reporting the completion of rehabilitation, restoration or replanting works.

Figure 28: Total area of native vegetation cleared since 2015–16

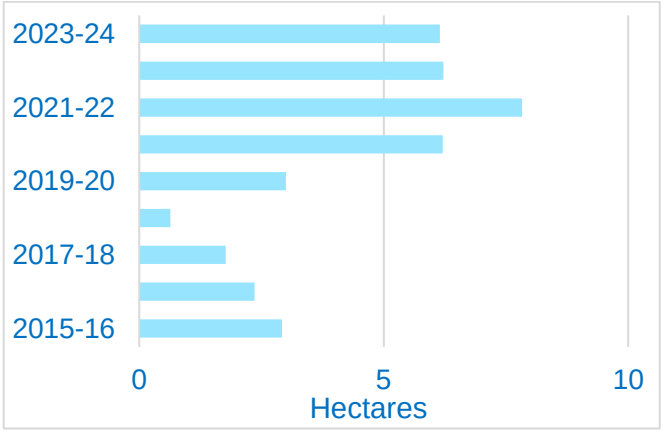


Figure 29: Total area of native vegetation rehabilitated since 2015–16

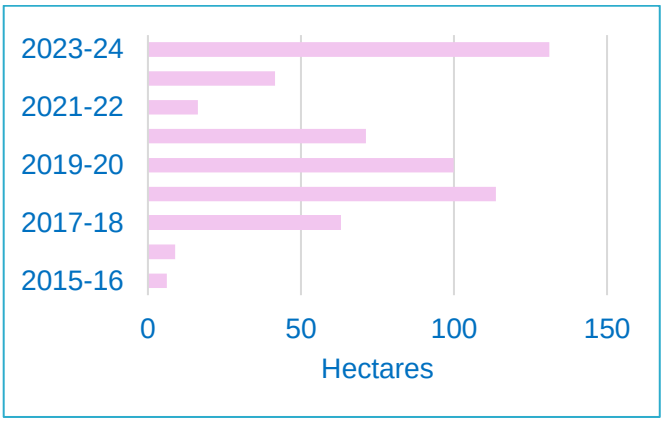
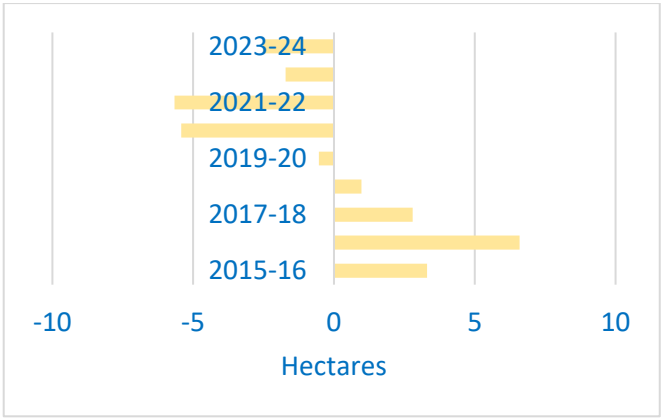


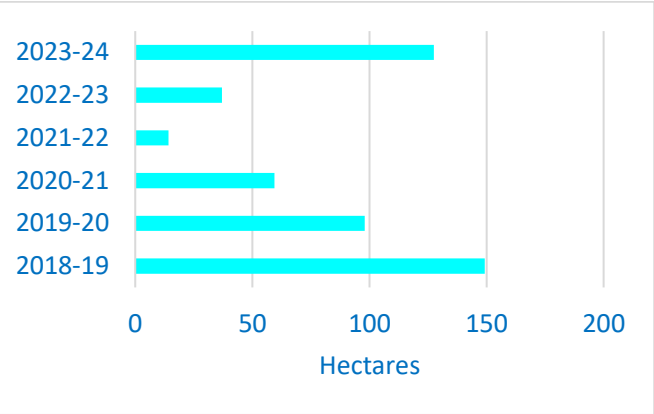
Figure 30: Total area of native vegetation gained since 2015–16



Sydney Water owned and managed properties

Sydney Water owns over 3,000 properties across its area of operations, including properties with threatened native vegetation, threatened ecological communities and locations with threatened fauna. We also manage 450 ha of riparian lands, wetlands and naturalised stormwater assets.

Figure 31: Land areas with natural restoration works for Sydney Water owned and managed properties



The total area of land owned by Sydney Water that had natural area restoration work conducted in 2023–24 was 127.6 hectares, a significant increase compared to 37.02 ha in 2022–23. These projects were undertaken under our Property Environmental Management Plans (PEMP), plans of management and in response to requirements to undertake weed control works and stormwater naturalisation works. The marked increase is mainly attributable to an increase in the area managed as part of our PEMP program (125.5 ha compared to 33.5 ha in 2022–23). Figure 31 shows the five-year trend of natural restoration works conducted on Sydney Water properties.

8. References

1. IPART Operating Licence 2019–2023, Sydney Water Reporting Manual (April 2022),
2. Bureau of Meteorology (January 2018) National Urban Water Utility Performance Reporting Framework: Indicators and definitions handbook